February 26, 2018

Ilene M. Munk
Managing Partner, Portland
Direct Dial: (503) 477-8660
imunk@foleymansfield.com

Via Email Only

Mr. Sean Sheldrake
Environmental Protection Agency
Region 10
1200 Sixth Avenue
MS ECL-122
Seattle, Washington 98101

Ms. Lori Cora
Assistant Regional Counsel
Environmental Protection Agency
Region 10, ORC-158
1200 Sixth Avenue
Seattle, Washington 98101

Re: Administrative Settlement Agreement and Order on Consent
USEPA Docket 10-2009-0255

Dear Mr. Sheldrake and Ms. Cora:

I am writing today regarding concerns Siltronic has concerning the above joint order (the "2009 AOC" or the "Order"), and to alert you to concerns resulting from recent regulatory filings by NW Natural. As you are aware, Siltronic has requested to be released from the Order under which Siltronic is jointly liable with NW Natural for the design of a remedy to be implemented prior to the overall remedy for the Portland Harbor. As discussed in previous correspondence dated August 7, 2017, and October 31, 2017, Siltronic believes it is appropriate for NW Natural to be the sole Respondent in the design work conducted under the 2009 AOC. New regulatory filings indicate that NW Natural continues to contaminate the areas offshore of the NW Natural site from unpermitted stormwater outfalls, and that the contamination is significant.

In contrast to NW Natural's continuing contamination of the Willamette River from upland sources as described below, Siltronic has planned and implemented a successful source control program for trichloroethene ("TCE") releases from the Siltronic site. Siltronic installed an enhanced in-situ bioremediation system ("EIB") in the upland source area between 2009 and 2011. The EIB program, which converts TCE and degradation products into nontoxic end products, reduced the TCE mass by 99.9 percent, and reduced the overall mass of chlorinated volatile organic compound ("CVOC") by 97.9 percent in the source area, based on current groundwater monitoring data collected by Siltronic. These results demonstrate that the Siltronic EIB project has effectively removed the vast majority of CVOCs in the source area groundwater, thereby dramatically reducing and/or eliminating further discharges of TCE to the Willamette River from the source area.

Therefore, Siltronic respectfully renews its request to be removed from the 2009 AOC.

In the alternative, Siltronic submits the following four comments and associated exhibits for the administrative record.

Comment 1: As contemplated by the 2009 AOC, Siltronic requests that EPA coordinate the design of the offshore remedy with DEQ's upland source control at the NW Natural site in order to prevent recontamination of the Willamette River from NW Natural's uncontrolled PAH sources.

The 2009 AOC recognized that upland source control was a necessary prerequisite to the design of an offshore remedy, and that EPA would determine when source control had been effectuated: "DEQ is the lead agency for conducting upland work necessary for source control . . . EPA will determine when sources have been controlled sufficiently for response action(s) to be implemented." 2009 AOC at p. 5. The 2009 AOC also recognized that DEQ's uplands source control actions should be coordinated with the work to be conducted under the 2009 AOC. *Id.*

Siltronic's concerns regarding this necessary coordination have recently escalated as recent filings have confirmed the ongoing nature of NW Natural's PAH contamination to the river. A June 2017 NW Natural report contained a chart showing how NW Natural's PAH levels compare to overall Portland Harbor levels. Exhibit 1 - Stormwater Source Control Evaluation Report at Table A-4g. Of the 12 highest PAH levels recorded in the Harbor sediment, three were from NW Natural. In addition, other NW Natural stormwater contaminants are elevated compared to overall levels measured in the Portland Harbor. *Id.* According to the DEQ guidance document concerning stormwater, these PAH levels indicate that "uncontrolled contaminant sources may be present at the site and additional evaluation and/or source control measures may be warranted." Exhibit 2 - Appendix E, Tool for Evaluating Stormwater Data at p. 3.

NW Natural recently submitted a draft Stormwater Source Control Measures and Performance Monitoring Plan (the "Stormwater Plan"), attached as Exhibit 3. The Stormwater Plan discloses that "[a]ll of the carcinogenic PAHs exceeded their bioaccumulation SLVs in most samples," and that "PAH concentrations from the Gasco property are well above the median concentrations for comparable industrial sites,"[1] but does not contain any proposed source control measure explicitly addressing PAHs. Instead, the Stormwater Plan relies heavily on NW Natural receiving a 1200-Z NPDES general permit for discharges from Outfall WR-107. *See* Exhibit 3, Stormwater Plan at pp. 28-29, 34-35. As noted below, Siltronic is concerned that the NPDES general permit levels for PAHs may not be sufficiently restrictive to prevent recontamination.

Comment 2: As contemplated by the 2009 AOC, Siltronic requests that EPA make a determination as to whether source control from the NW Natural site will be achieved sufficiently for response actions to be implemented if NW Natural is granted an additional NPDES stormwater permit.

[1] Exhibit 3, Stormwater Source Control Measures and Performance Monitoring Work Plan (draft), Anchor QEA January 5, 2018, at p. 21.

While DEQ is the lead agency responsible for upland source control, EPA controls the determination of whether the source control is adequate to support implementation of the in-river remedy. 2009 AOC at p. 5. Uncontrolled sources of PAH currently exist at the NW Natural site according to DEQ's March 2016 Portland Harbor Upland Source Control Summary Report.[2] The severity of NW Natural's uncontrolled PAH discharges are underscored in the June 2017 Stormwater Source Control report and the January 2018 Stormwater Plan cited above.

However, Siltronic's concerns are not limited to the uncontrolled PAH sources at the site. Siltronic is equally concerned that even if NW Natural limits its discharges to levels allowed under existing and pending DEQ stormwater permits, recontamination may still occur.

NW Natural currently has two NPDES permits which cover stormwater. Permit No. 103061, effective September 7, 2013, is for stormwater and treated groundwater discharges from Outfall #1 at the site and includes discharges from the LNG containment system. Permit No. 23135 is for the PacTerm Lease Area. In December 2017, NW Natural submitted a third NPDES stormwater permit application for WR-107, a private stormwater outfall to the Willamette River. Siltronic learned that this outfall was unpermitted only a short time before NW Natural submitted the application.[3] NW Natural's permit application included data from effluent testing conducted at WR-107 in 2009 and 2010. These samples contain high levels of carcinogenic PAHs. *See* Exhibit 4, NW Natural NPDES 1200-Z Stormwater Permit Application at Attachment 2.

In 2013, EPA acted through contractor CDM Smith to evaluate the potential for recontamination that would result from the issuance of an NPDES permit for the LNG containment and wastewater treatment system. *See* Memorandum entitled "Application of Portland Harbor Recontamination Evaluation Framework to Proposed Treated Wastewater Outfall, Gasco Early Action Site" dated December 19, 2013, attached as Exhibit 5.

CDM Smith's analysis indicated that for the conservative set of model parameters, the PAH levels allowed under the permit (0.0038 µg/L) resulted in 30-year recontamination levels very close to the Preliminary Remediation Goal ("PRG") of 50 µg/kg. The PRG level of 50 µg/kg is significantly higher than the ROD's cleanup level for cPAHs[4] in nearshore sediments of 12 µg/kg. It is therefore possible that the same analysis conducted using the actual ROD levels would have put the permitted PAHs above the level at which recontamination might be expected to occur. In addition, while the CDM Smith SEDCAM modeling used the permit level of 0.0038 µg/L, the actual permit issued to NW Natural allowed hundreds of times this level of PAHs to be discharged under the permit. See Exhibit 5 (setting permit level for benzo(a)pyrene and other PAHs at 0.0038 µg/L, but stating that "[c]ompliance will be demonstrated by not exceeding the

[2] Portland Harbor Upland Source Control Summary Report at p. 70 (March 2016).

[3] Siltronic learned that the WR-107 outfall was unpermitted during a November 2, 2017, meeting held with EPA, DEQ, NW Natural, Exxon, BP, and other industry participants.

[4] Provided in the ROD as BaP equivalent. Record of Decision at Table 17, Summary of Cleanup Levels or Targets by Media.

Quantitation Limit of 1 µg/L."). The SEDCAM modeling did not take this compliance limit of 1 µg/L into account when determining the potential for recontamination.

Now NW Natural seeks a third NPDES permit to allow stormwater discharges from the WR-107 outfall. The Stormwater Plan notes that the levels of PAHs from WR-107 are more than the levels from the LNG containment area. Stormwater Plan at p. 23 ("However, storm solids concentrations in sediment trap samples from Outfall WR 107 are also elevated. PAH concentrations in the LNG Plant Area are comparatively lower ..."). The 2017 draft permit cover letter for the NW Natural permit disclosed a reference concentration for PAHs of 1.0 µg/L, attached as Exhibit 6. While DEQ is charged with setting the permitted levels of PAHs allowed under the NPDES system, EPA is charged with determining when PAH levels have been sufficiently controlled to allow implementation of the remedy. Siltronic respectfully requests that the EPA conduct an evaluation similar to the 2013 CDM Smith study to determine whether the PAH levels allowed under the 2017 1200-Z permit, when added to the 2013 levels already permitted for Outfall 1, will result in recontamination of the Willamette River.

Siltronic submitted comments to NW Natural's 1200-Z permit application, attached as Exhibit 7. Siltronic includes those comments as an attachment to this letter so that the comments will be placed into the administrative record.

Comment 3: Comment 3: Lack of adequate sampling for other COCs in sediments removed in the eventual remedy may pose a risk for contamination of new sites.

An additional concern with the timing and focus of the work planned as a result of the 2009 Order involves the possibility that dioxins (and other focus COCs) are present in the sediment prism that NW Natural contemplates dredging as a result of the remedy designed under the Order. Although sampling has been insufficient to determine the extent of the problem, onshore sampling conducted on the Allen Tract of the Siltronic property demonstrate that the highest dioxin levels occur adjacent to the property boundary with NW Natural adjacent to the Willamette River. *See* Exhibit 8.

During recent meetings regarding the 2009 Order, NW Natural discussed sampling for all focus COCs so that the dredge prism design would adequately address all COCs. Siltronic agrees that pre-dredge sampling of the prism for all COCs is of paramount importance to the work conducted under the 2009 Order. Siltronic also believes, however, that post-dredge sampling of the dredge prism spoils is necessary to provide adequate information for spoils disposal.

Siltronic understands that a data gap analysis is forthcoming pursuant to the terms of the 2009 AOC. Siltronic respectfully requests that if Siltronic is not released from the 2009 AOC as requested in this and other communications contained in the administrative record, that it be given the opportunity to provide meaningful input on the data gaps analysis and all subsequent tasks under the 2009 AOC. In particular, Siltronic requests that it be allowed to provide input on the pre-dredge sampling program to ensure that dioxin and other COC levels in the sediment are sufficiently characterized so that the dredge spoils are managed appropriately to prevent contamination of any off-site disposal areas.

Siltronic proposed a procedure for continuing input in the 2009 AOC in a letter dated January 11, 2018. Siltronic has not yet received a response to its proposed procedure. Given NW Natural's forthcoming submission of the data gaps analysis, Siltronic requests that the EPA give immediate attention to the letter so that all parties are in agreement on the procedures to be followed in future submissions.

Comment 4: Siltronic objects to EPA's decision to shrink the proposed project area for the Gasco Sediment Site, absent further sampling to demonstrate such is scientifically warranted.

Siltronic would also like to express its concerns related to EPA's decision to shrink the proposed project area for Gasco Sediment Site as was articulated in EPA's November 1, 2017, letter to NW Natural, absent further sampling that demonstrates such is a scientifically sound approach to the overall cleanup efforts at the Portland Harbor. In its initial comment letter to NW Natural regarding the Work Plan, dated October 18, 2017, EPA indicated that the Gasco Sediment Site Final Project Area ("FPA") for remedial design was to be "defined as the sediment management area ("SMA") located on the west side of the Willamette River…extending from river mile (RM) 5 to the Railroad Bridge located at approximately RM 6.9." *See* General Comment 2. By retracting this comment, it appears the EPA may be willing to reduce the FPA.

Siltronic understands that EPA's decision to retract its original comment related to the extent of the FPA was in large part the result of conversations it had with NW Natural. Again, Siltronic was not a party to those conversations, nor was it invited to the meeting at which the conversations took place. As far as Siltronic is able to tell, EPA's decision was based on NW Natural's having threatened to invoke dispute resolution because EPA's comments were "outside the scope of the current agreement and prevents [NW Natural] from moving forward…" Siltronic disagrees with the position taken by NW Natural, and objects to any effort to re-define the boundaries of the FPA. Siltronic disagrees with NW Natural's statement that EPA's initial interpretation as to the FPA "falls outside the scope of the [2009 AOC]".

Based on language contained in the 2009 Statement of Work and subsequent EPA-approved work plans, it is clear that the parties to the Order understood that boundary delineation for the FPA would be dictated in large part by the extent to which NW Natural-derived contaminants were found to occur in river sediments. Given that the SMA which the Gasco Sediment Site falls within is characterized primarily by the presence of NW Natural-impacted sediments, the boundaries to the SMA should inform the boundaries of the FPA. This result is further supported by statements made by EPA in response to public comments, which were incorporated in the Record of Decision: "[r]emedial design for the Gasco remedy will account for *any* NAPL (also known as Substantial Product) present in sediment." ROD at p. 2136 (emphasis added).

The ROD formed the basis for the current boundaries of the SMA offshore NW Natural and Siltronic, and further extending downstream. Such a determination was made on the basis of data that may be insufficient for the purposes of delineating the actual extent of contamination during design and implementation of the remedy. As EPA acknowledged in its Record of Decision for

the Portland Harbor, the current vertical and horizontal extents of NW Natural- derived PTW-NAPL in sediments offshore of NW Natural and Siltronic have not been fully delineated.[5]

As Siltronic currently understands the process proposed by NW Natural, the locations of samples collected for the purpose of evaluating the extent of DNAPL in sediments is effectively confined to a more limited scope, without clear data demonstrating the appropriateness of those boundaries. It therefore seems counterintuitive for EPA to state in the ROD that it lacks sufficient information to determine the current extent of NW Natural-derived DNAPL, while simultaneously agreeing to allow NW Natural to arbitrarily confine the boundaries of its investigation in a manner that disregards what was otherwise contemplated in the ROD vis-à-vis the SMA boundaries. If the existing data as relied upon in the ROD for delineation of the current SMAs suggests DNAPL associated with former NW Natural operations extends upstream at least as far as RM 6.9, Siltronic is puzzled as to why EPA appears to be allowing the design work to be limited in a manner that will only account for a fraction of the sediments impacted by NW Natural's former operations.

Siltronic is sensitive to EPA's desire to have design work completed at the NW Natural site as soon as possible, and acknowledges the current timeline for the upcoming Pre-RD sampling effort has the potential of delaying the project. However, Siltronic believes the value of having a complete and accurate understanding of the extent of NW Natural-impacted sediments justifies any delays to the project timing. Moreover, the baseline data that will be generated as a result of the Pre-RD sampling efforts will be invaluable to the extent it can be used for comparing the effectiveness of the final remedy.

Siltronic welcomes any feedback EPA may be willing to offer concerning the issues raised in this letter and would be happy to answer any questions EPA may have regarding the contents of the letter.

Sincerely,

Ilene M. Munk

Ilene M. Munk
Attachments

cc: Dana Bayuk, DEQ *(w/attachments via email only)*
Kevin Parrett, DEQ *(w/attachments via email only)*
Myron Burr *(w/attachments via email only)*
David Rabbino *(w/attachments via email only)*
Michael Murray *(w/attachments via email only)*
Bob Wyatt, NW Natural *(w/attachments via email only)*
Patty Dost, Pearl Legal *(w/attachments via email only)*

[5] The current distribution of Gasco DNAPL in sediments is not fully understood, nor is the mobility of the material understood.

ATTACHMENTS

EXHIBIT 1

DRAFT

ECSI No. 84
June 30, 2017
NW Natural Gasco Site

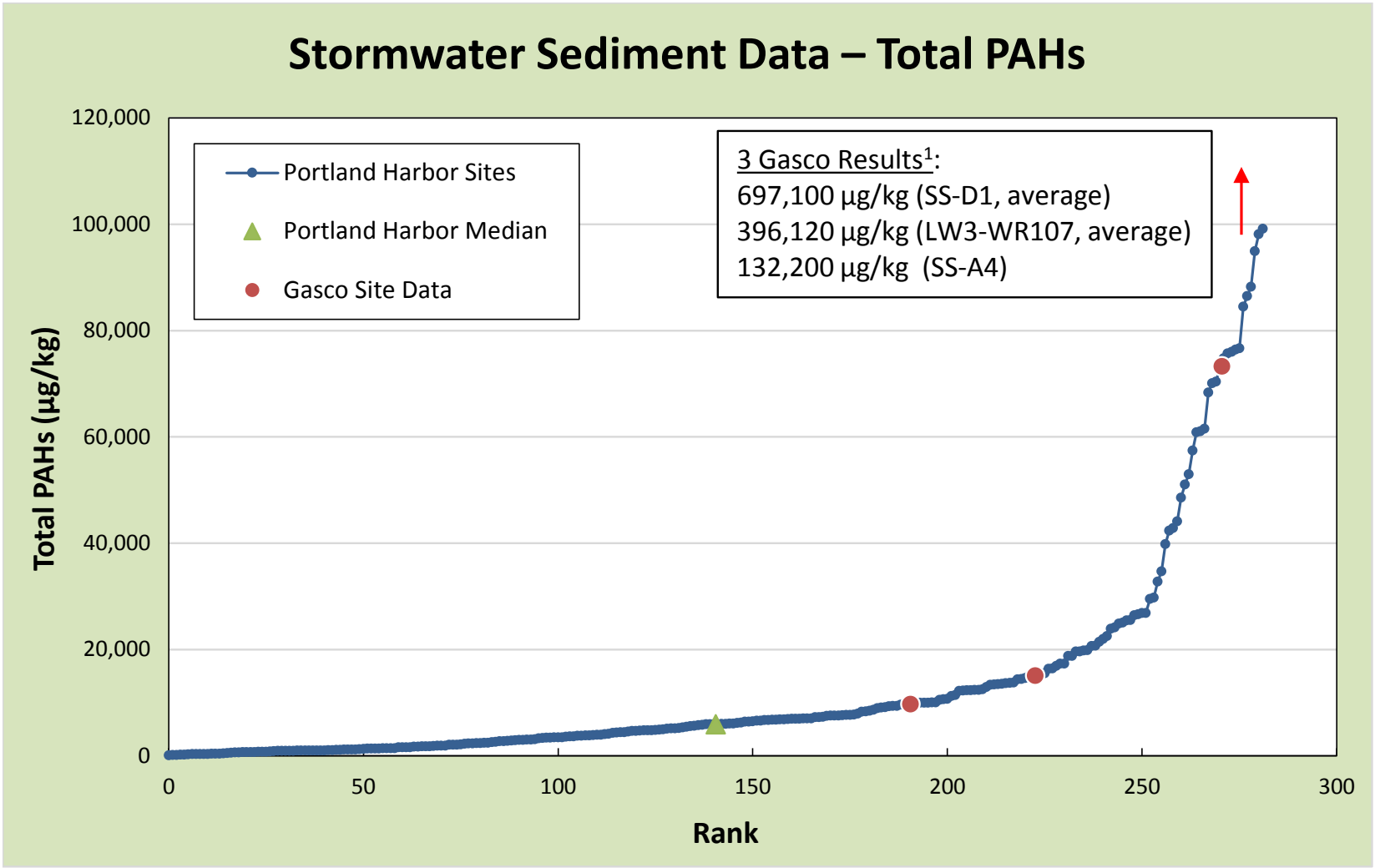
ANCHOR QEA

Stormwater Source Control Evaluation Report

Prepared for NW Natural

Exhibit 1-001

Table A-4g
Storm Solids Data Cumulative Distribution Plots



Notes:
1. The highest 12 values from the Portland Harbor data were omitted from the curve, consistent with Department of Environmental Quality guidance. Three Gasco storm sediment results (SS-A4, the average of the LW3-WR107 parent and replicate sample results, and the average of the SS-D1 parent and duplicate sample results) ranked among the 12 highest values in the Portland Harbor data set and were omitted from the curve. Sample location SS-D1 is upstream of the PacTerm oil-water separator, and sample location SS-A4 is a catch basin on an inactive storm line from the Koppers lease area that is recommended

µg/kg: microgram per kilogram PAH: polycyclic aromatic hydrocarbon

Sample results and sample duplicate or replicate results were averaged for plotting purposes.

EXHIBIT 2

Appendix E

Tool for Evaluating Stormwater Data

From: ***DEQ Guidance for Evaluating the Stormwater Pathway at Upland Sites***

Cleanup Program
700 NE Multnomah
Portland, OR 97232
Phone: 503-229-5696
800-452-4011
Fax: 503-229-6762

www.oregon.gov/DEQ

DEQ is a leader in restoring, maintaining and enhancing the quality of Oregon's air, land and water.

DEQ
State of Oregon
Department of
Environmental
Quality

Exhibit 2-001

Documents can be provided upon request in an alternate format for individuals with disabilities or in a language other than English for people with limited English skills. To request a document in another format or language, call DEQ in Portland at 503-229-5696, or toll-free in Oregon at 1-800-452-4011, ext. 5696; or email deqinfo@deq.state.or.us.

APPENDIX E:
TOOL FOR EVALUATING STORMWATER DATA

For the sake of readability, the term "stormwater" refers to all types of samples used to create this tool, including stormwater, catch basin sediment and suspended sediment samples.

The following charts were created using contaminant concentration data from stormwater samples collected at Portland Harbor-area industrial sites. They are intended to be used as a screening tool for distinguishing "typical" industrial stormwater from stormwater containing potentially elevated contaminant concentrations. Elevated contaminant concentrations are an indication that contamination may be present at the site and that additional investigation and source control may be needed.

There are two sets of charts – one for water and one for solids. Charts were developed for 12 contaminants and Total Suspended Solids (water only). The contaminants include:

Arsenic	Copper	Silver
Bis(2-Ethylhexyl)phthalate	Lead	Total PAHs
Cadmium	Mercury	Total PCBs
Chromium	Nickel	Zinc

While the charts can be used to identify samples that "stand out from the crowd" they *do not* provide an indication of the potential for stormwater discharges to result in waterbody impacts. The charts were not developed to support that type of determination.

Section 1 Basis for Using the Charts as a Screening Tool

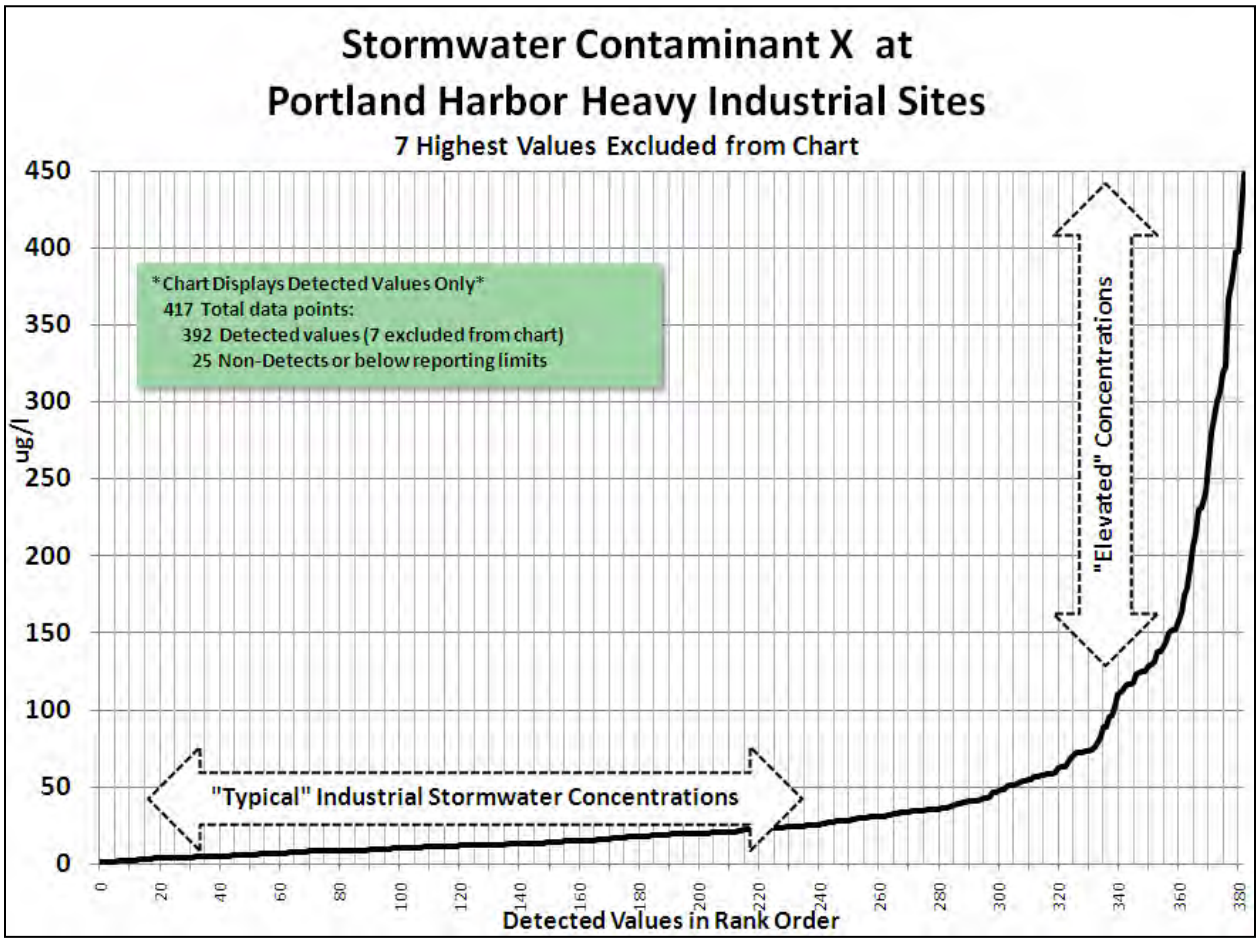
The use of these charts as a screening tool is based on the premise that many kinds of industrial materials and activities have the potential to result in minor releases of contaminants, such as petroleum products in drips of oils, greases and fuels used for vehicles and machinery, phthalates off-gassing from paints and PVC piping, and zinc from galvanized building materials. Off-site sources, including highway traffic, operations at neighboring sites and atmospheric deposition, can also contribute to the contaminant load in stormwater runoff from a site.

As a result, industrial stormwater is likely to contain a somewhat predictable list of contaminants within a predictable concentration range even when good stormwater management practices are being implemented. If contaminant concentrations exceed these ranges, DEQ considers this to be a potential indicator of an uncontrolled source of contaminants at the site.

Due to the highly variable nature of stormwater, interpretations made using these charts should only be considered in the context of other lines of evidence and should not be presumed to provide conclusive evidence of the presence or absence of contamination at a site.

Section 2 Screening Stormwater Data Using the Charts

An example of a typical chart for a stormwater contaminant is provided below. In most charts there is a definitive "knee" in the curve and the majority of data points fall within the relatively flat portion of the curve below the knee. To screen stormwater data from a specific site, determine where the contaminant concentrations fall along the curve on the relevant chart.



The upper and lower bounds of the "knee" are purposefully left undefined on the charts to help avert a misinterpretation of the screening results. Defining these bounds might suggest that the charts were developed with more statistical rigor than was the case, or that the range of typical vs. elevated concentrations is the same for all sites.

Section 3 Interpreting the Results

Stormwater data are one line of evidence to consider when conducting a stormwater pathway evaluation and the charts are a tool for interpreting the data.

- Concentrations falling within the **upper/steeper portion of the curve** are an indication that uncontrolled contaminant sources may be present at the site and additional evaluation and/or source control measures may be warranted. The objective would be to determine the source(s) of the elevated concentrations and, based upon that, whether and what types of source control measures are needed.

- Concentrations falling within the **lower/flatter portion of the curve** suggest that stormwater is not being unusually impacted by contaminants at the site and is therefore representative of "typical" industrial stormwater for Portland Harbor sites. However, this interpretation should not be considered to be a conclusive line of evidence. A determination that no additional source control or evaluation is necessary should be corroborated by other lines of evidence.

Section 4 Additional Considerations

The screening results need to be evaluated based upon the characteristics of the site. Some sites can be expected to have higher concentrations of certain types of contaminants simply as a result of the type of operations (e.g., phthalates associated with painting activities, PAHs associated with heavy equipment and fueling). Slightly higher concentrations of specific contaminants might be considered to be "normal" at these sites but indicate potential contamination at others. However, neither *typical* nor *normal* is the same as *acceptable*. As stated above, these charts were developed for identifying potentially contaminated sites and helping to guide source control evaluations. They are not designed to be used for evaluating the potential waterbody impacts of stormwater discharges.

An additional consideration when evaluating stormwater data is whether the data are likely to be representative of typical stormwater discharges from the site. Stormwater samples taken from the same location can show widely varying concentrations depending on the duration and intensity of the storm events that were sampled, whether the sample was collected early or late in the storm, the length of the dry period preceding the storms, and the activities occurring at the site since the previous storm event or catch basin cleanout. This should be considered when determining how much weight to apply to stormwater data in the course of a stormwater evaluation and/or whether additional data are needed to support a decision.

Section 5 Process and Quality Assurance Steps for 2015 Update

This Appendix E tool was first made available in October 2010. DEQ completed an update of theses curves in October 2015. The update improved the tool by enhancing the datasets represented with additional data collected at the same sites as well as new sites that drain to the Portland Harbor Superfund study area. Section 5 was added to document the process and quality control and assurance steps taken to improve confidence in the reliability of this screening tool.

Data Compilation

The first step was to compile stormwater and stormwater solids data collected since the 2009 development of the original tool. DEQ contacted representatives at sites engaged in stormwater source control work and requested submittal in Excel format of all stormwater and stormwater solids data collected since 2009. In early 2015, DEQ received data from 25 sites – 9 new sites and 16 sites with data previously included in the original curves. Data was checked to make sure it was not already in the original graphs. Sample results entered into master spreadsheets were checked to ensure they had been correctly copied over from the site provided data set files.

Compiled data were culled to remove individual results that were not compatible with the master set. Data removed included:

- NPDES data
- Dissolved concentrations (only total concentrations were included)
- Duplicate samples
- Erodible soil samples
- Samples of groundwater infiltration into stormwater pipes (dry weather flow samples)
- Isolated roof runoff samples

For results with individual PCBs and PAHs, DEQ calculated total values by summing all detectable measurements. If all measurements were below the method detection limit (MDL), DEQ classified the sample as a non-detect and use the largest individual MDL as the sample's value. If calculated totals were provided, DEQ confirmed the same methodology was used or else recalculated.

DEQ then reformatted the new data into the configuration used to create the original charts, standardized analyte names, checked for unit continuity, eliminated extraneous information, checked for errors and backed up the new master dataset. After creating a master spread sheet of both new and old data, new versions of all charts were generated and these were reviewed by several staff and compared against the original charts.

Comparison to Original Charts and Additional QA/QC

Y-The vertical axis were scaled so as to allow a meaningful direct comparison to the original charts; outlier results were confirmed, excluded and accounted for; and the horizontal axes were scaled so as to include only the number of samples represented. Other observations led to an addition QA/QC round. These included:

- Random sampling indicated there might be some repeated entries in the stormwater datasets. DEQ confirmed that data was not repeated or removed any confirmed to be repeated.
- Many of the curves looked remarkably similar to the previous charts created in 2010, so DEQ double-checked that the master datasets included all data.
- The chart for PCBs in stormwater solids does show a visually significant shift from the 2010 version. Because the PCB datasets in the original stormwater and stormwater solids charts were the smallest datasets, DEQ suspected that additional data might shift these curves. DEQ re-verified the PCBs solids curve to ensure this visually apparent difference is accurate. The 2015 chart appears to have a point of increasing curvature around 200 ug/kg, where previously increasing curvature was noted around 170 ug/kg.

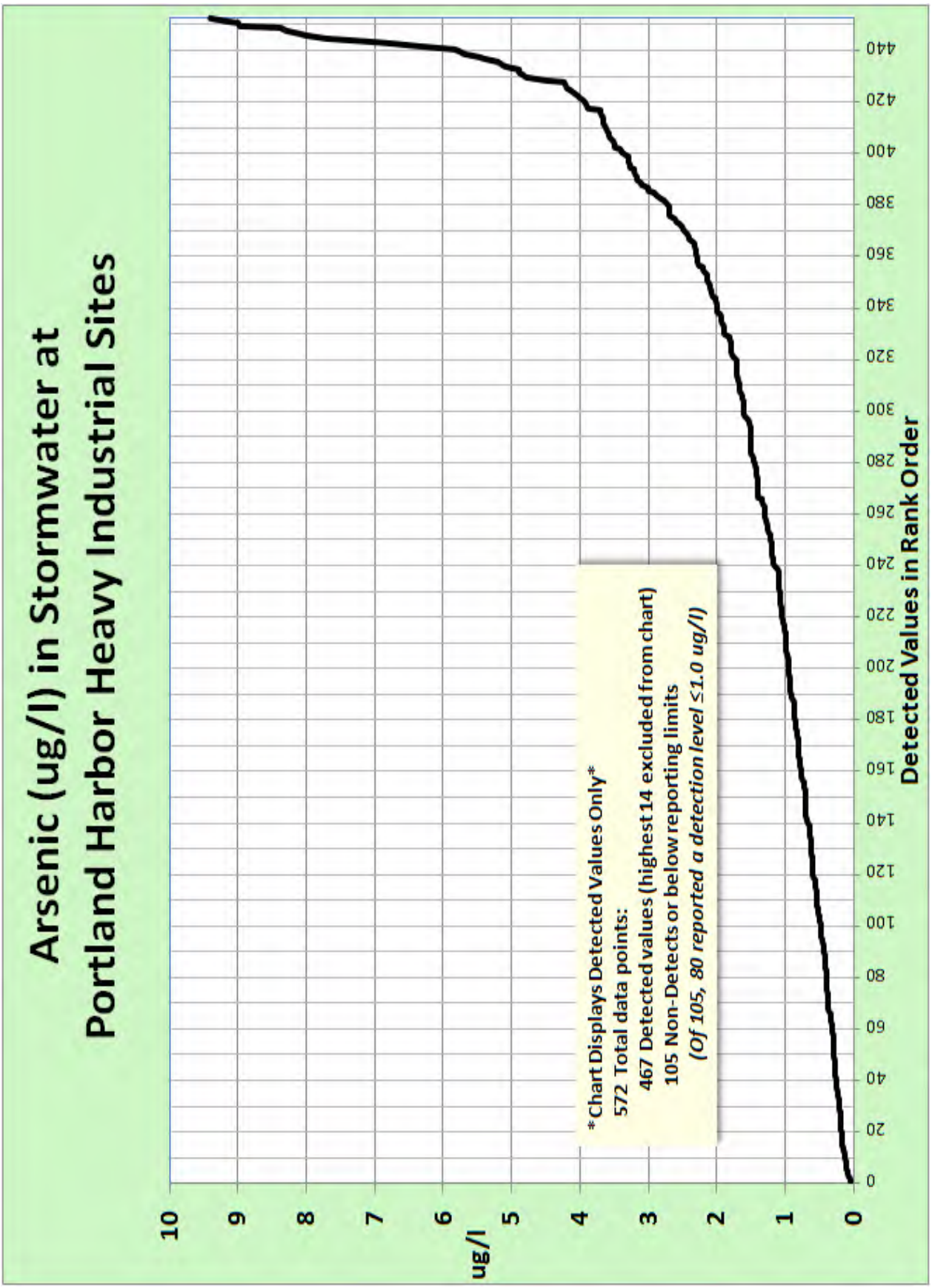
In evaluating the above issues, DEQ determined that 192 stormwater data points with detected results were potential repeats, or approximately 3 percent, mostly found in the original curves data sets. No stormwater solids repeats were identified. Because these were mainly from the original data as compiled, they were removed to avoid expendind the effort to recheck each individual original dataset. Charts were created again following removal of the potential repeated data. In addition, some repeated data were identified among the non-detected stormwater results, which were removed from the master datasets. Because non-detected values are excluded from the charts, however, this change has no effect on the charts.

All data points were grouped and recounted as detects, non-detects and excluded outliers, for both the stormwater and stormwater solids datasets. This verified that all original chart data (excluding the repeated results) and all newly compiled data were appropriately displayed.

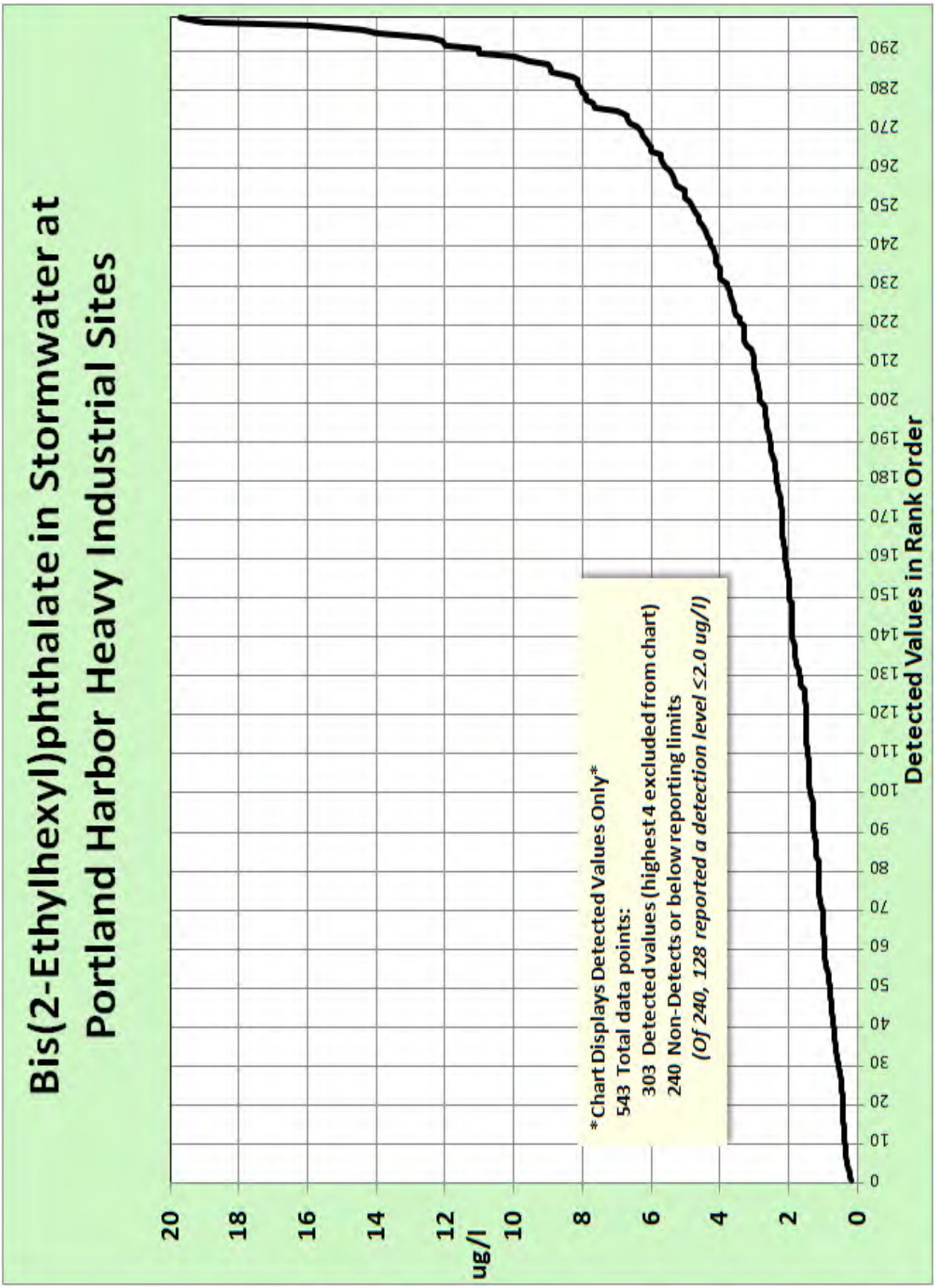
Each old and newly added data point with a detected result in the PCB solids chart was reverified and duplicates were screened for a final time to confirm that the slight shift was an accurate result of the enhancement of the dataset.

STORMWATER CHARTS

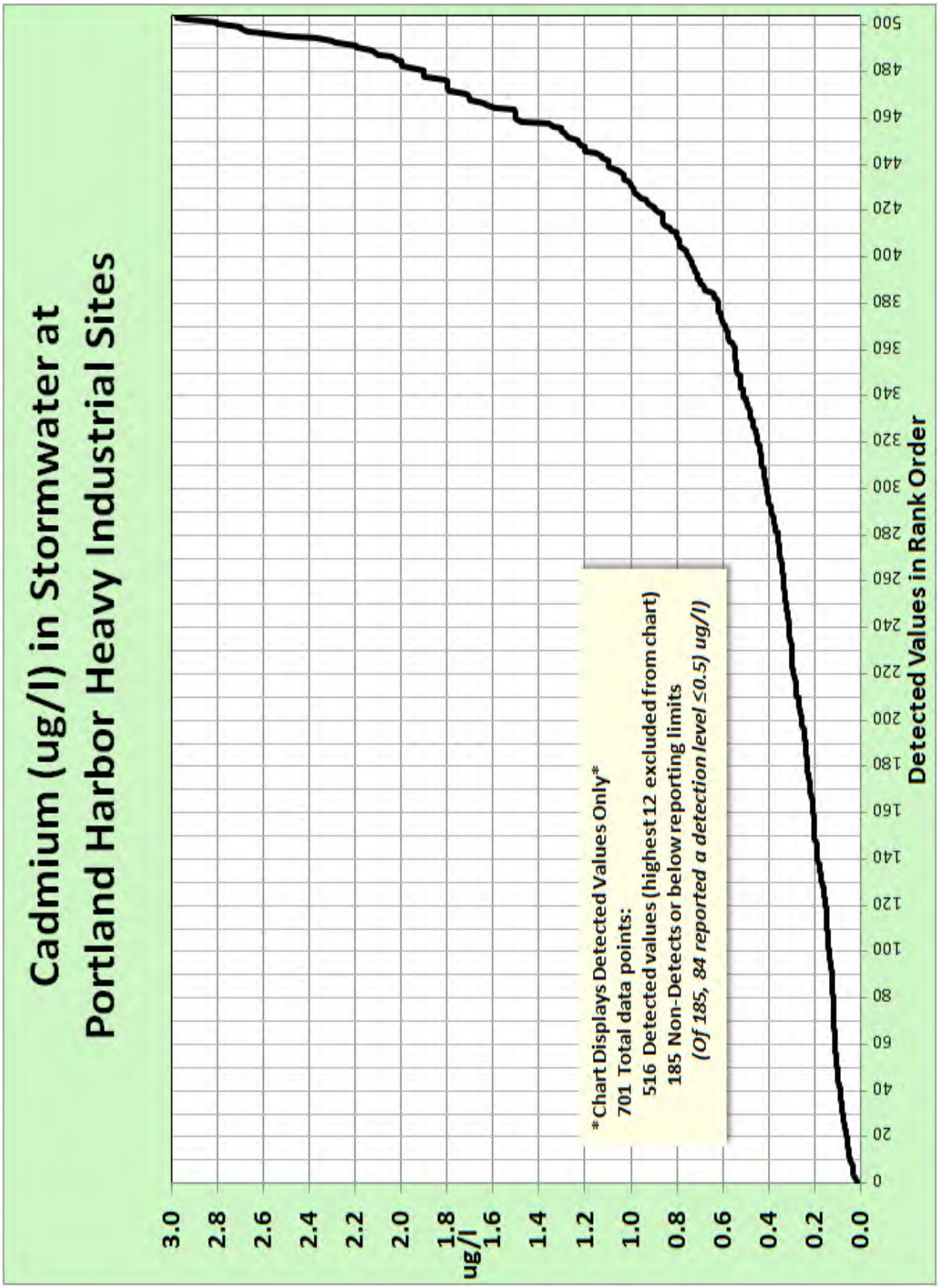
All stormwater data represents whole water/unfiltered samples.


Arsenic (ug/l) in Stormwater at
Portland Harbor Heavy Industrial Sites
ug/l
10
9
8
7
6
5
4
3
2
1
0
Detected Values in Rank Order
0
20
40
60
80
100
120
140
160
180
200
220
240
260
280
300
320
340
360
380
400
420
440
* Chart Displays Detected Values Only*
572 Total data points:
467 Detected values (highest 14 excluded from chart)
105 Non-Detects or below reporting limits
(Of 105, 80 reported a detection level ≤1.0 ug/l)

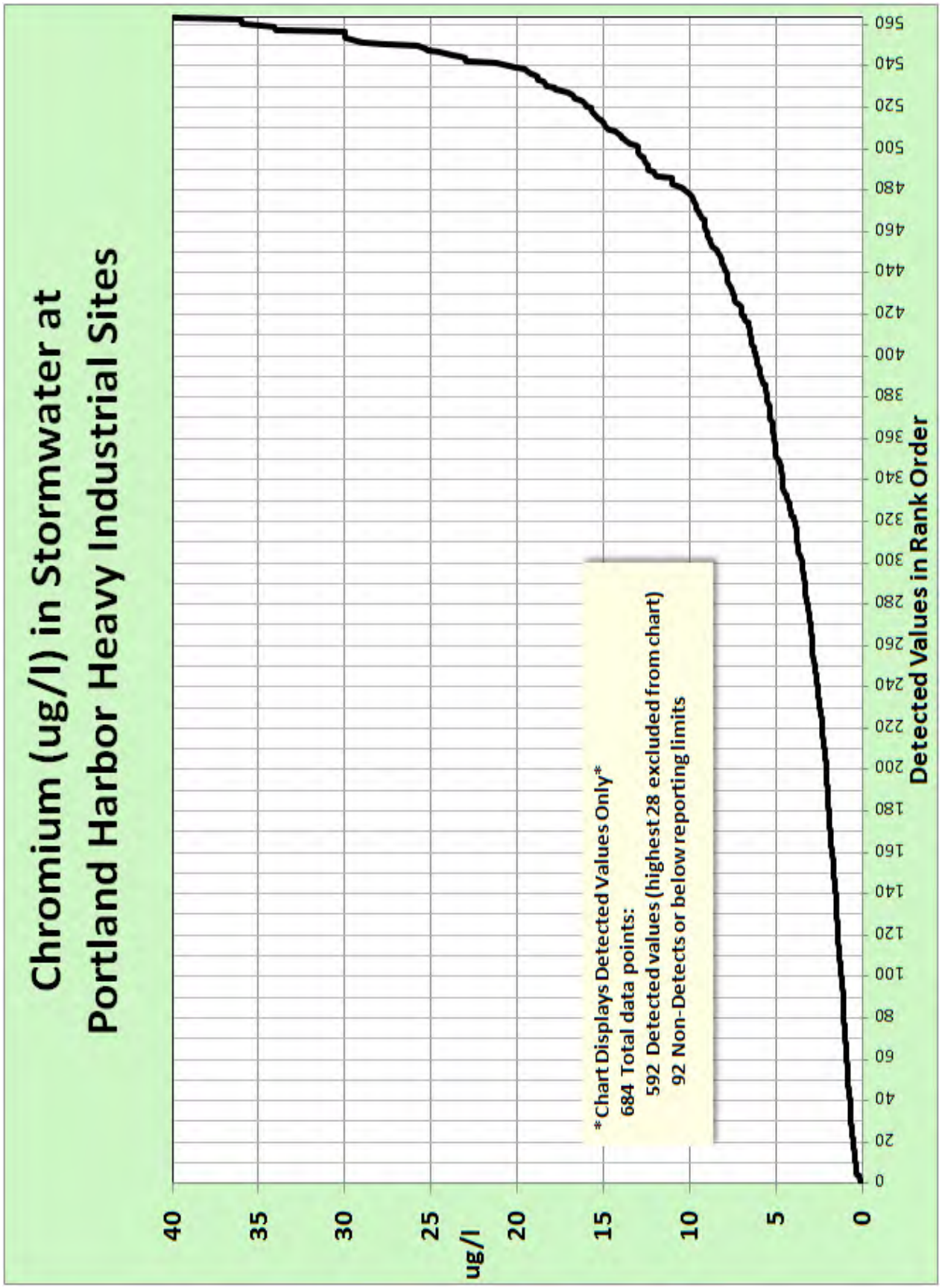
ARSENIC


Bis(2-Ethylhexyl)phthalate in Stormwater at Portland Harbor Heavy Industrial Sites
ug/l
0
2
4
6
8
10
12
14
16
18
20
Detected Values in Rank Order
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170
180
190
200
210
220
230
240
250
260
270
280
290
Chart Displays Detected Values Only
543 Total data points:
303 Detected values (highest 4 excluded from chart)
240 Non-Detects or below reporting limits
(Of 240, 128 reported a detection level ≤2.0 ug/l)

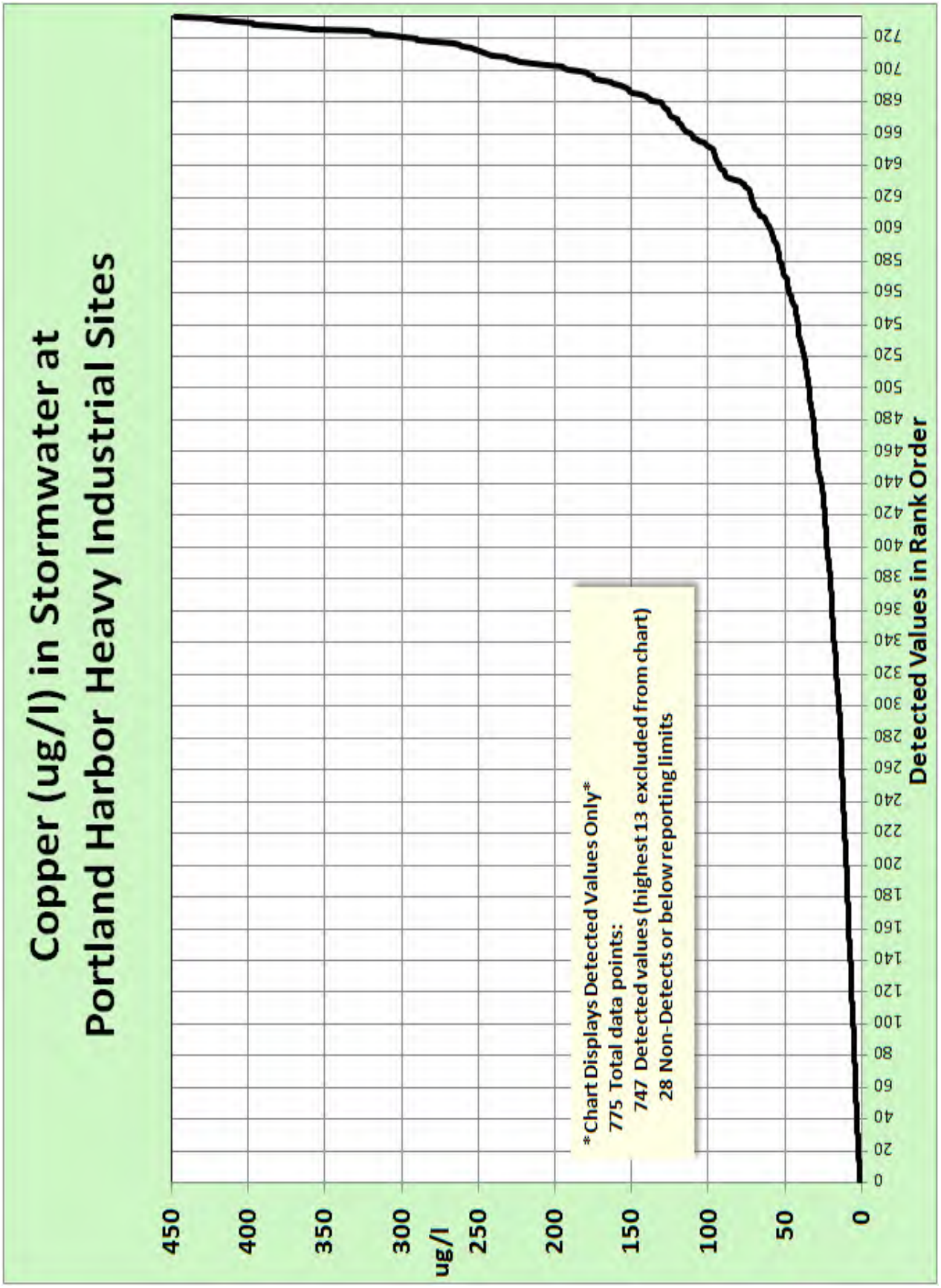
BEHP


Cadmium (ug/l) in Stormwater at Portland Harbor Heavy Industrial Sites
ug/l
3.0
2.8
2.6
2.4
2.2
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
Detected Values in Rank Order
0
20
40
60
80
100
120
140
160
180
200
220
240
260
280
300
320
340
360
380
400
420
440
460
480
500
* Chart Displays Detected Values Only*
701 Total data points:
516 Detected values (highest 12 excluded from chart)
185 Non-Detects or below reporting limits
(Of 185, 84 reported a detection level ≤0.5) ug/l)

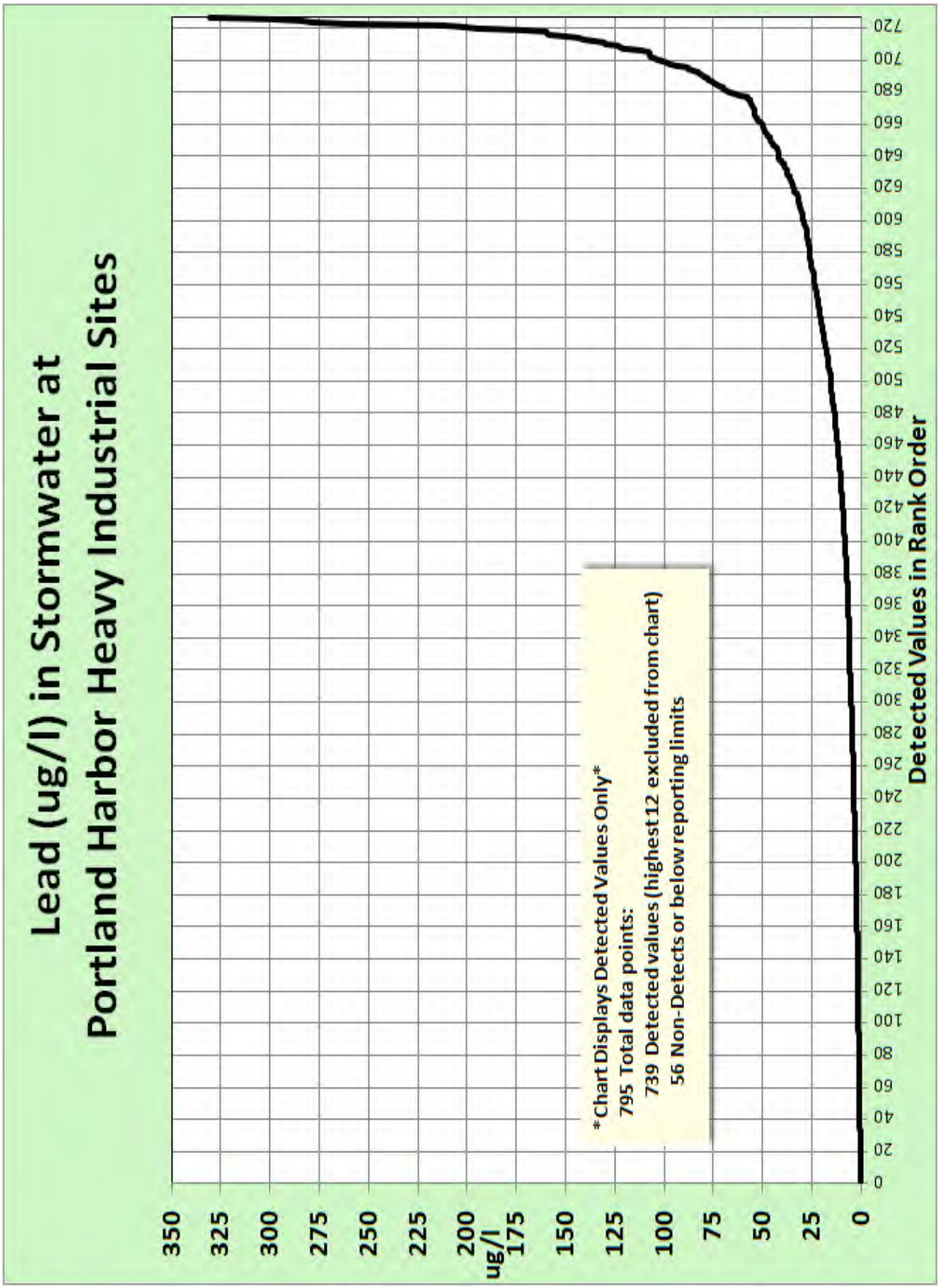
CADMIUM


Chromium (ug/l) in Stormwater at Portland Harbor Heavy Industrial Sites
ug/l
40
35
30
25
20
15
10
5
0
Detected Values in Rank Order
560
540
520
500
480
460
440
420
400
380
360
340
320
300
280
260
240
220
200
180
160
140
120
100
80
60
40
20
0
Chart Displays Detected Values Only
684 Total data points:
592 Detected values (highest 28 excluded from chart)
92 Non-Detects or below reporting limits

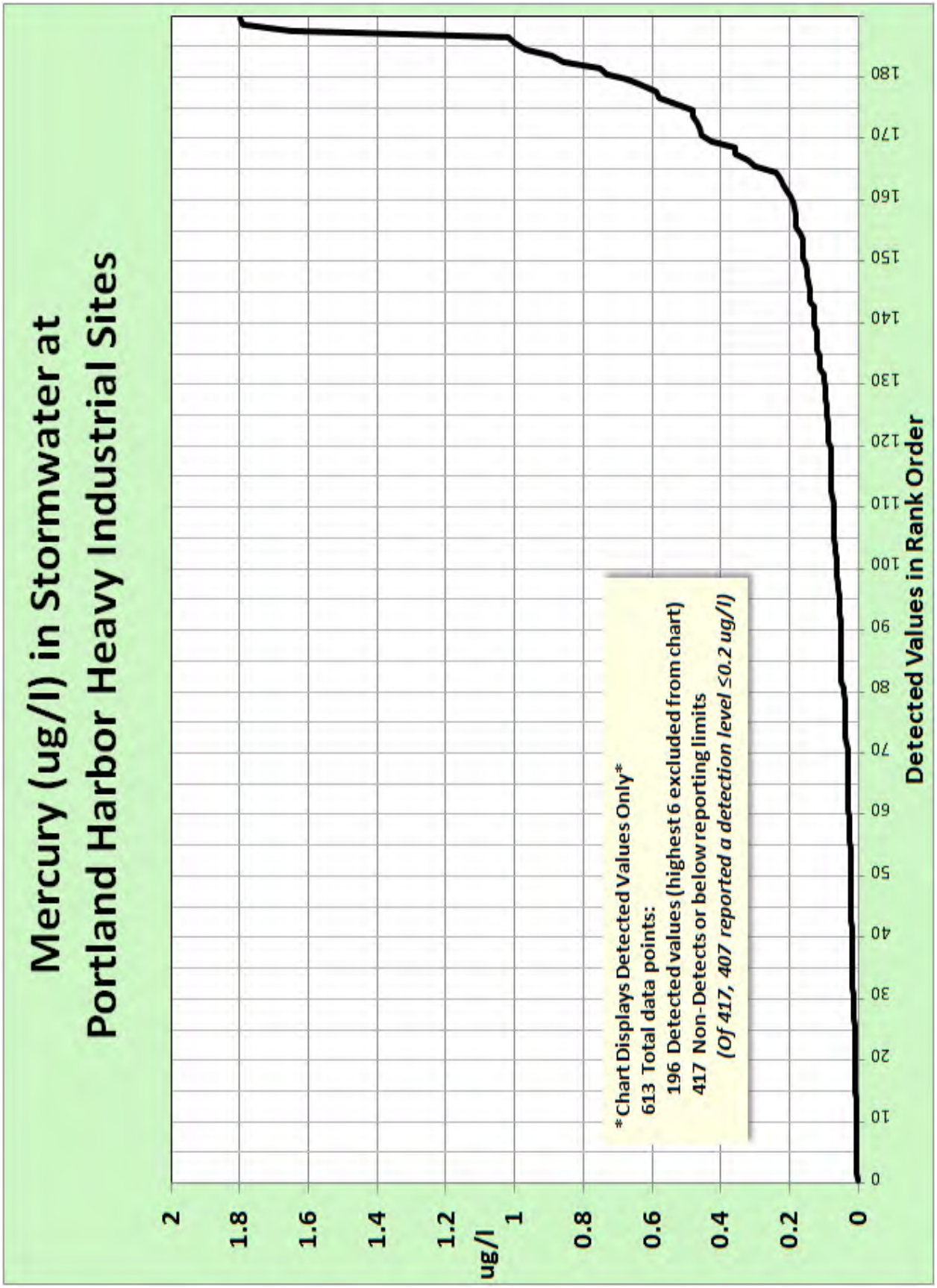
CHROMIUM


Copper (ug/l) in Stormwater at Portland Harbor Heavy Industrial Sites
ug/l
450
400
350
300
250
200
150
100
50
0
Detected Values in Rank Order
720
700
680
660
640
620
600
580
560
540
520
500
480
460
440
420
400
380
360
340
320
300
280
260
240
220
200
180
160
140
120
100
80
60
40
20
0
Chart Displays Detected Values Only
775 Total data points:
747 Detected values (highest 13 excluded from chart)
28 Non-Detects or below reporting limits

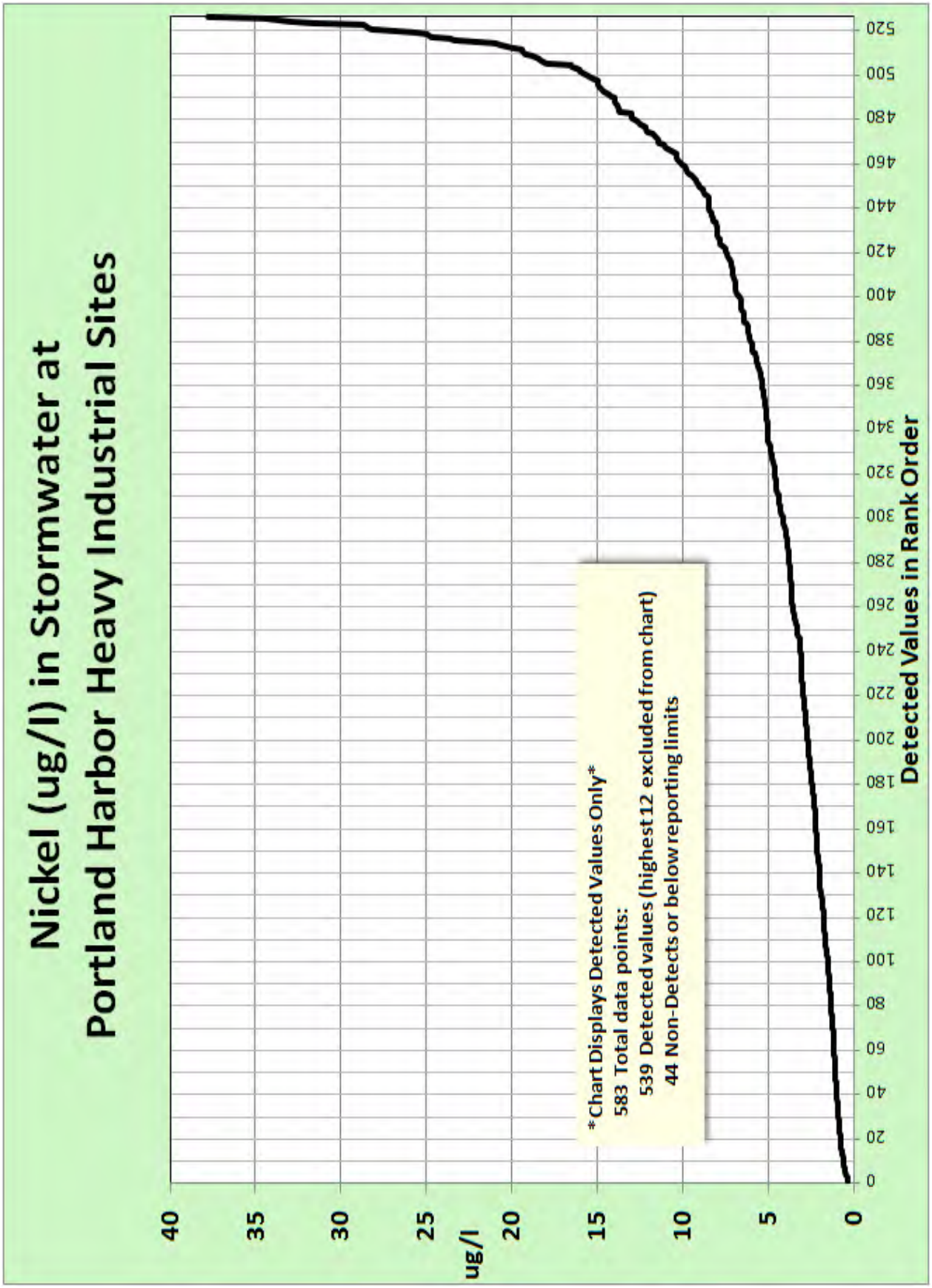
COPPER


Lead (ug/l) in Stormwater at
Portland Harbor Heavy Industrial Sites
ug/l
350
325
300
275
250
225
200
175
150
125
100
75
50
25
0
Detected Values in Rank Order
720
700
680
660
640
620
600
580
560
540
520
500
480
460
440
420
400
380
360
340
320
300
280
260
240
220
200
180
160
140
120
100
80
60
40
20
0
Chart Displays Detected Values Only
795 Total data points:
739 Detected values (highest 12 excluded from chart)
56 Non-Detects or below reporting limits

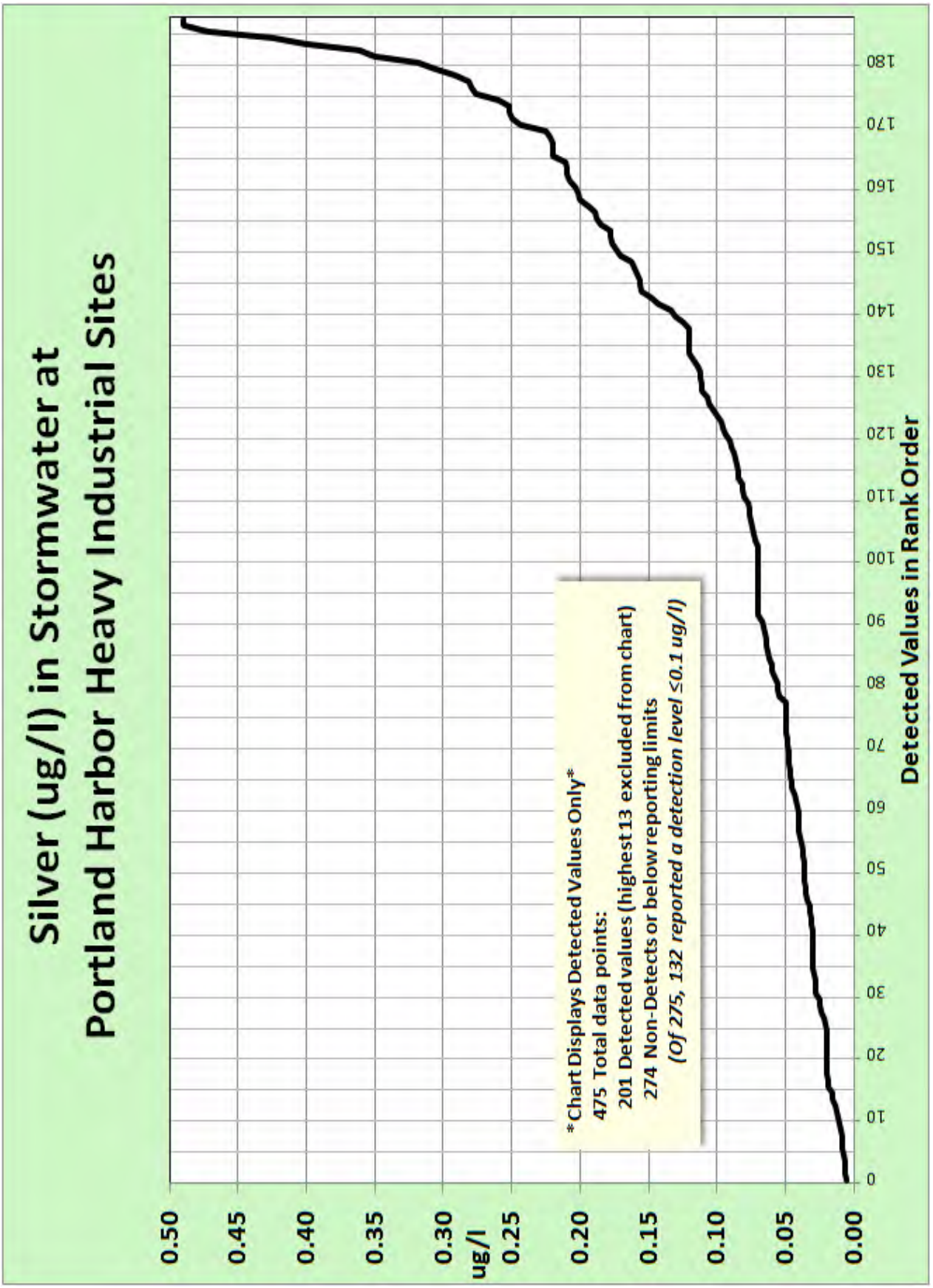
LEAD


Mercury (ug/l) in Stormwater at
Portland Harbor Heavy Industrial Sites
ug/l
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
Detected Values in Rank Order
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170
180
Chart Displays Detected Values Only
613 Total data points:
196 Detected values (highest 6 excluded from chart)
417 Non-Detects or below reporting limits
(Of 417, 407 reported a detection level ≤0.2 ug/l)

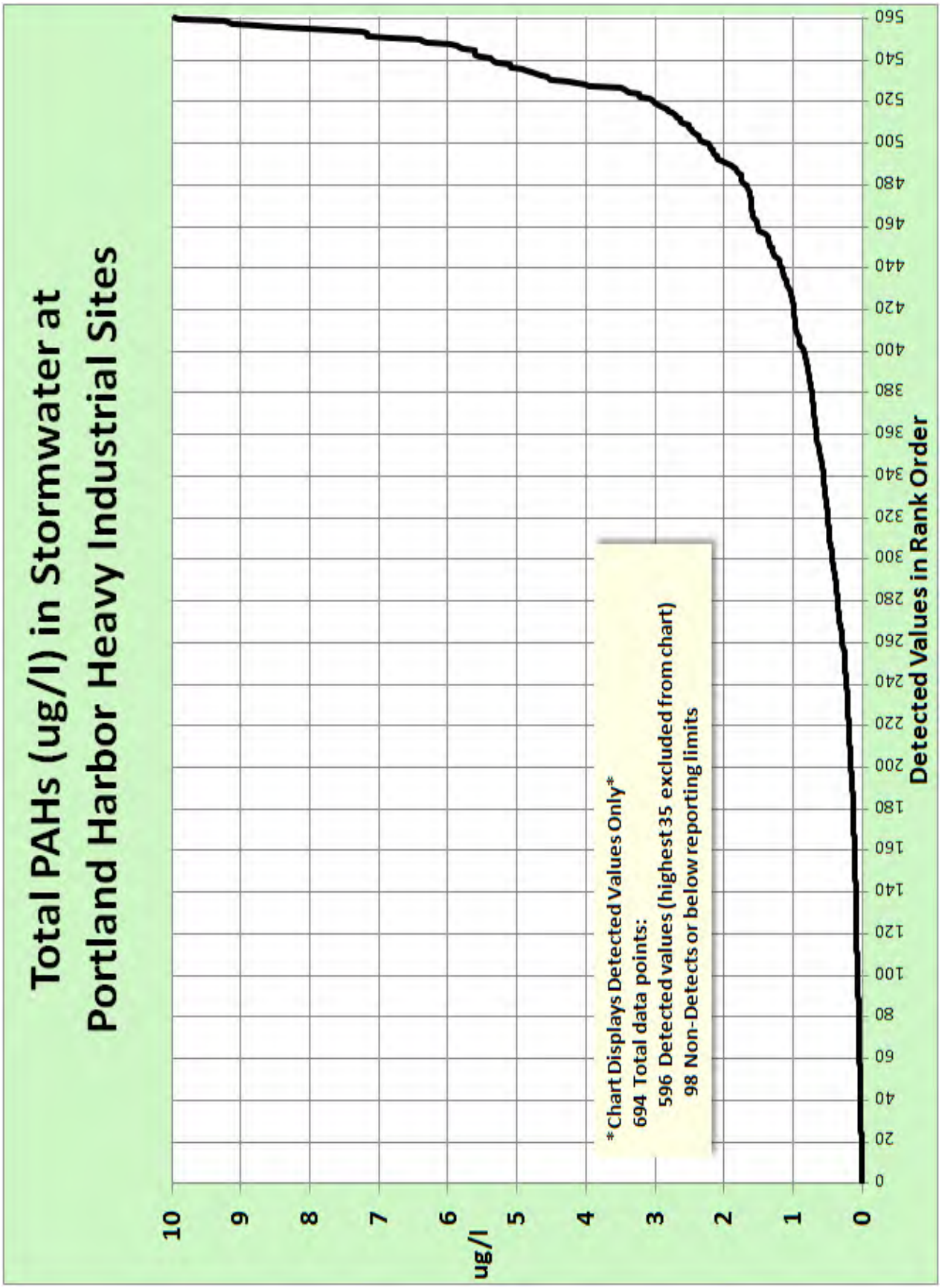
MERCURY


Nickel (ug/l) in Stormwater at
Portland Harbor Heavy Industrial Sites
ug/l
40
35
30
25
20
15
10
5
0
Detected Values in Rank Order
520
500
480
460
440
420
400
380
360
340
320
300
280
260
240
220
200
180
160
140
120
100
80
60
40
20
0
Chart Displays Detected Values Only
583 Total data points:
539 Detected values (highest 12 excluded from chart)
44 Non-Detects or below reporting limits

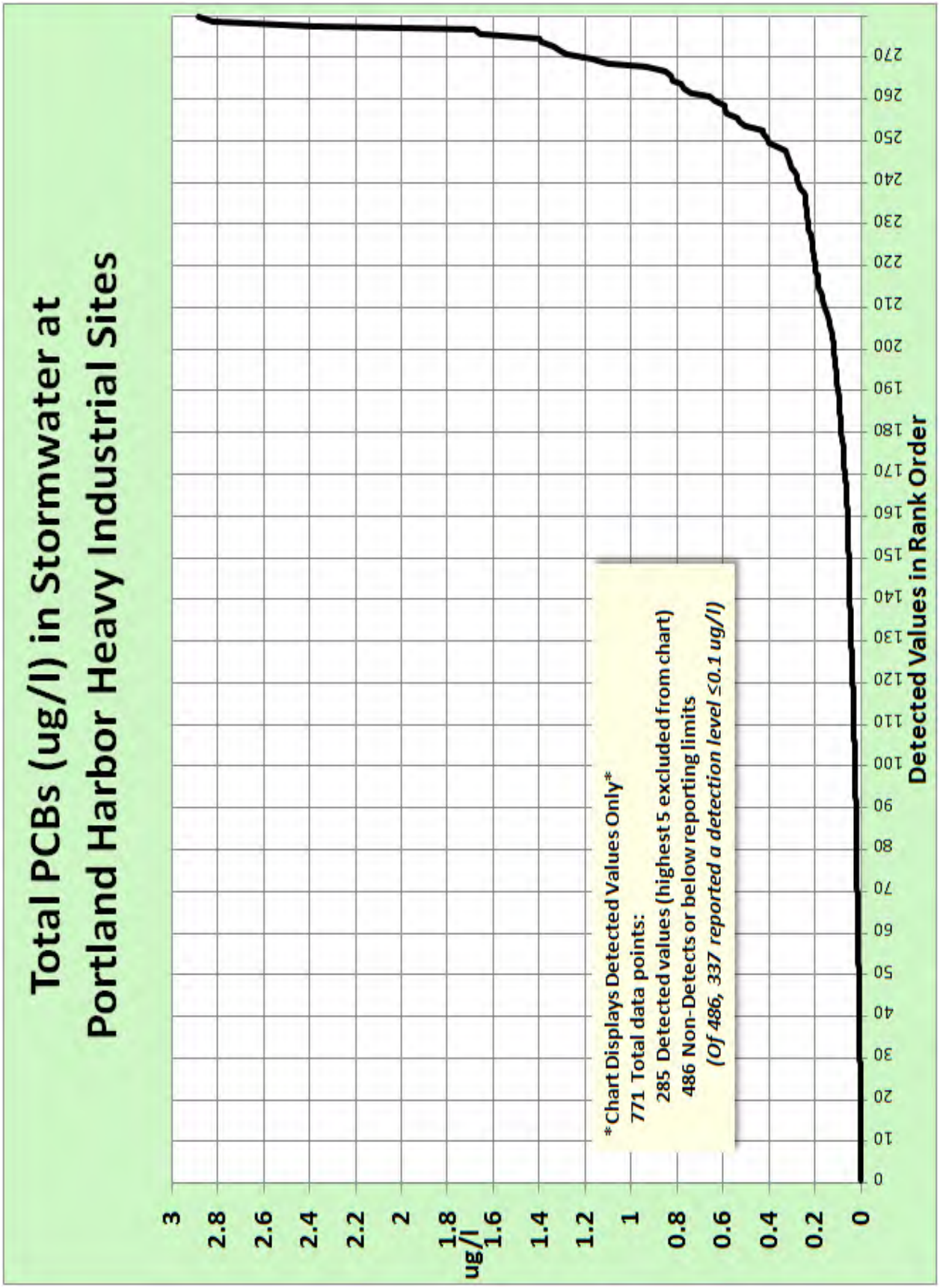
NICKEL


Silver (ug/l) in Stormwater at
Portland Harbor Heavy Industrial Sites
ug/l
0.50
0.45
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
Detected Values in Rank Order
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170
180
* Chart Displays Detected Values Only*
475 Total data points:
201 Detected values (highest 13 excluded from chart)
274 Non-Detects or below reporting limits
(Of 275, 132 reported a detection level ≤0.1 ug/l)

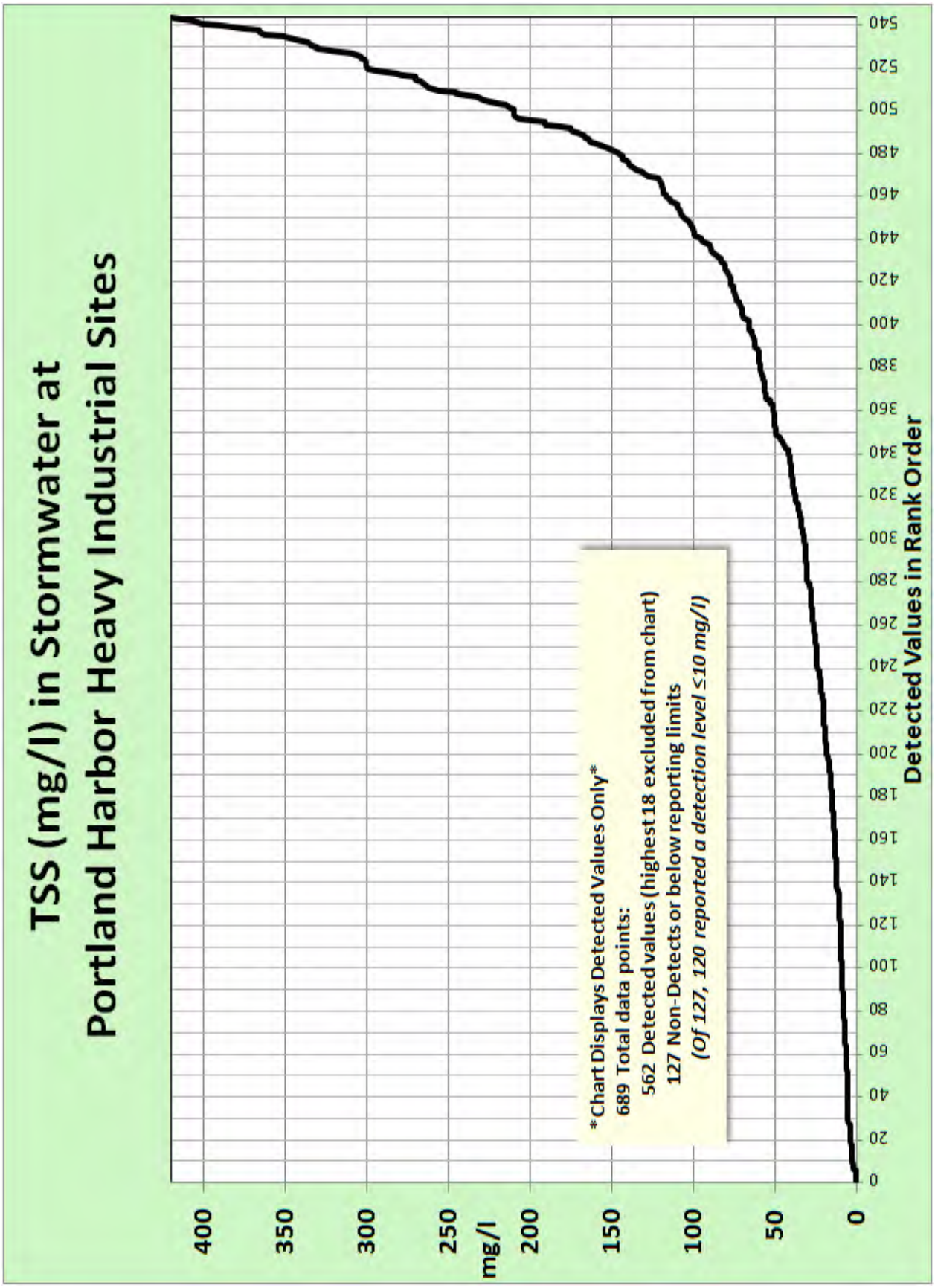
SILVER


Total PAHs (ug/l) in Stormwater at Portland Harbor Heavy Industrial Sites
ug/l
10
9
8
7
6
5
4
3
2
1
0
Detected Values in Rank Order
560
540
520
500
480
460
440
420
400
380
360
340
320
300
280
260
240
220
200
180
160
140
120
100
80
60
40
20
0
Chart Displays Detected Values Only
694 Total data points:
596 Detected values (highest 35 excluded from chart)
98 Non-Detects or below reporting limits

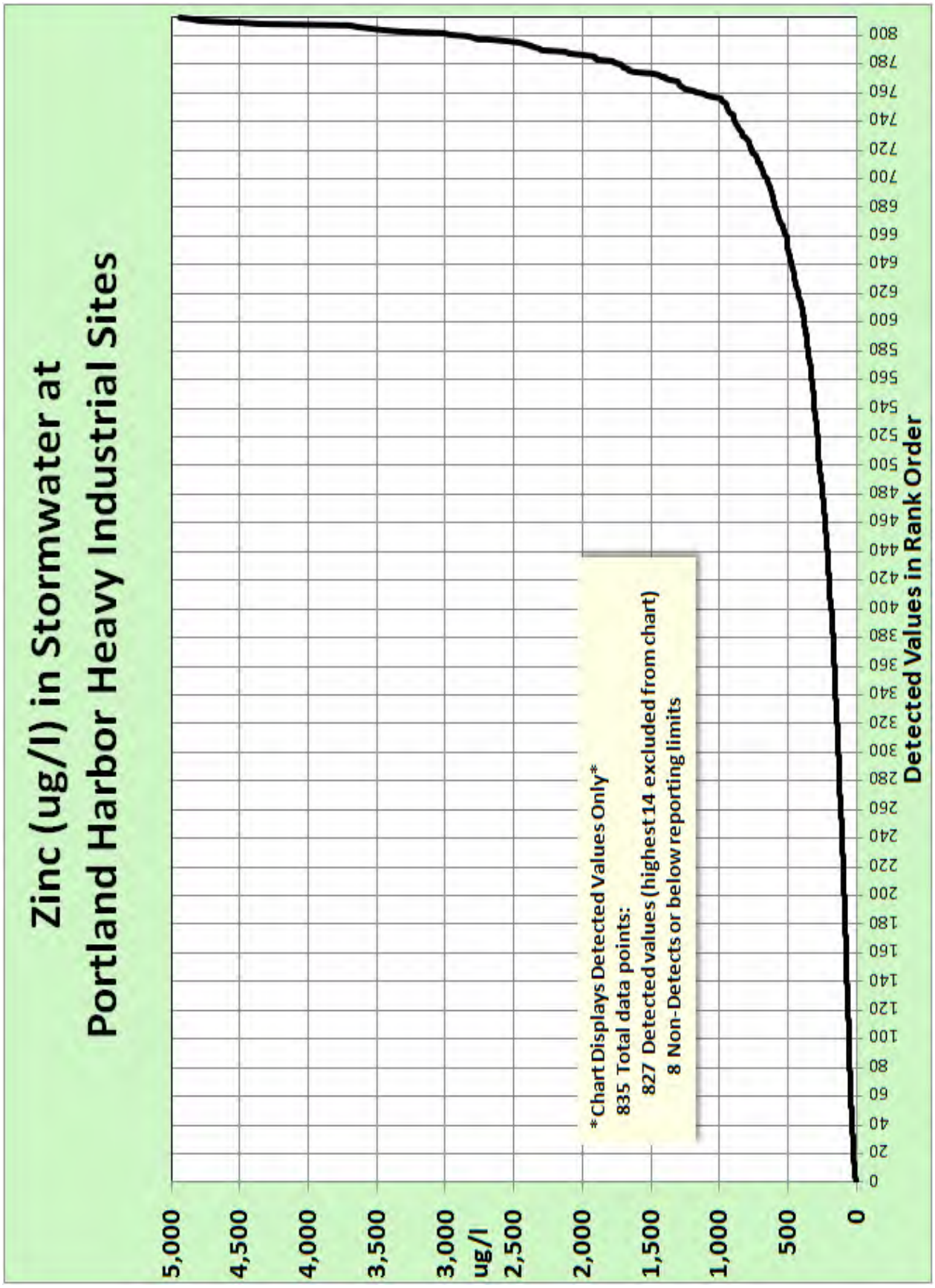
TOTAL PAHs


Total PCBs (ug/l) in Stormwater at Portland Harbor Heavy Industrial Sites
ug/l
3
2.8
2.6
2.4
2.2
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
Detected Values in Rank Order
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170
180
190
200
210
220
230
240
250
260
270
Chart Displays Detected Values Only
771 Total data points:
285 Detected values (highest 5 excluded from chart)
486 Non-Detects or below reporting limits
(Of 486, 337 reported a detection level ≤0.1 ug/l)

TOTAL PCBs


TSS (mg/l) in Stormwater at
Portland Harbor Heavy Industrial Sites
mg/l
400
350
300
250
200
150
100
50
0
Detected Values in Rank Order
0
20
40
60
80
100
120
140
160
180
200
220
240
260
280
300
320
340
360
380
400
420
440
460
480
500
520
540
* Chart Displays Detected Values Only*
689 Total data points:
562 Detected values (highest 18 excluded from chart)
127 Non-Detects or below reporting limits
(Of 127, 120 reported a detection level ≤10 mg/l)

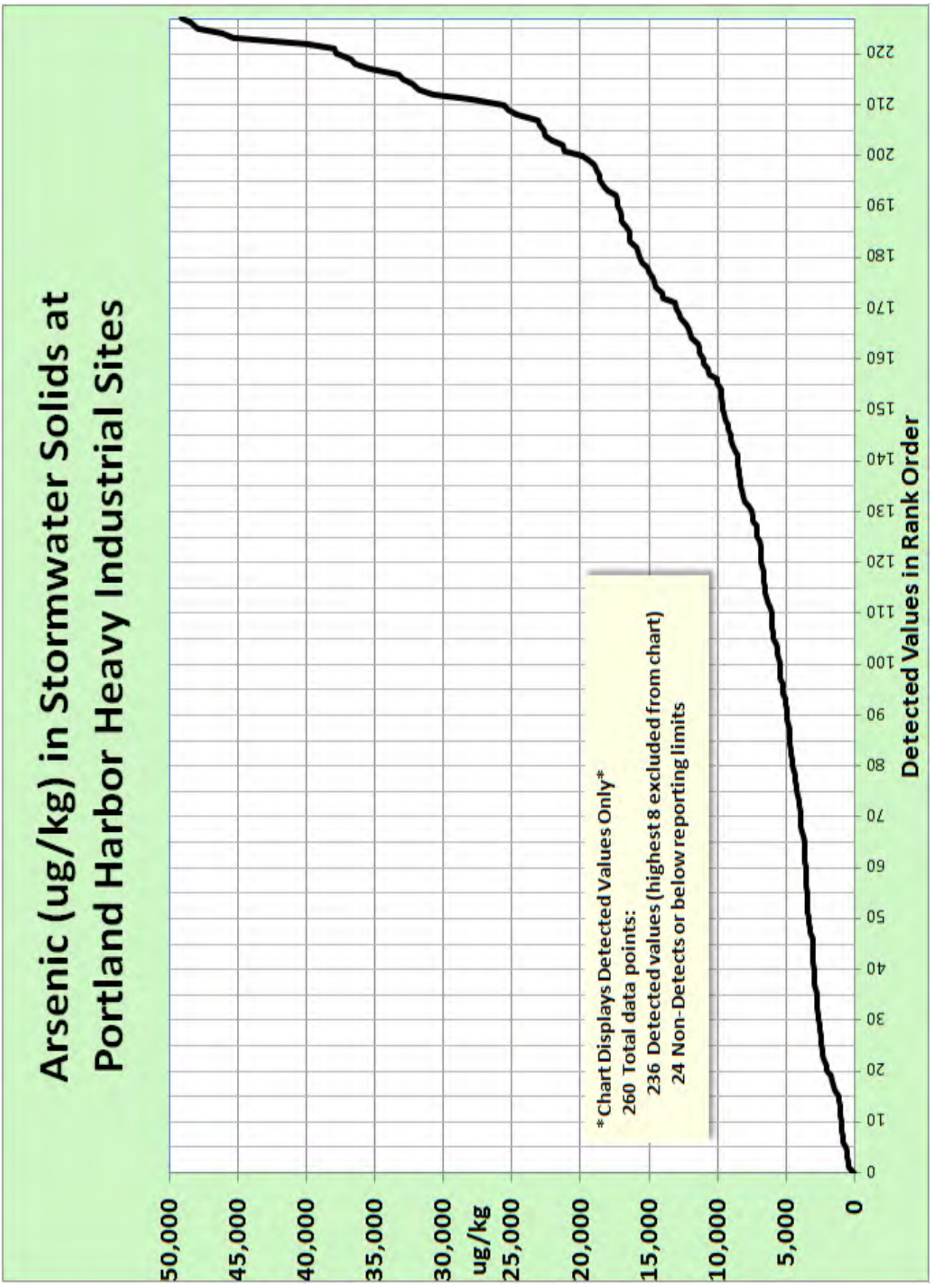
TSS


Zinc (ug/l) in Stormwater at
Portland Harbor Heavy Industrial Sites
5,000
4,500
4,000
3,500
3,000
2,500
2,000
1,500
1,000
500
0
ug/l
Detected Values in Rank Order
* Chart Displays Detected Values Only*
835 Total data points:
827 Detected values (highest 14 excluded from chart)
8 Non-Detects or below reporting limits

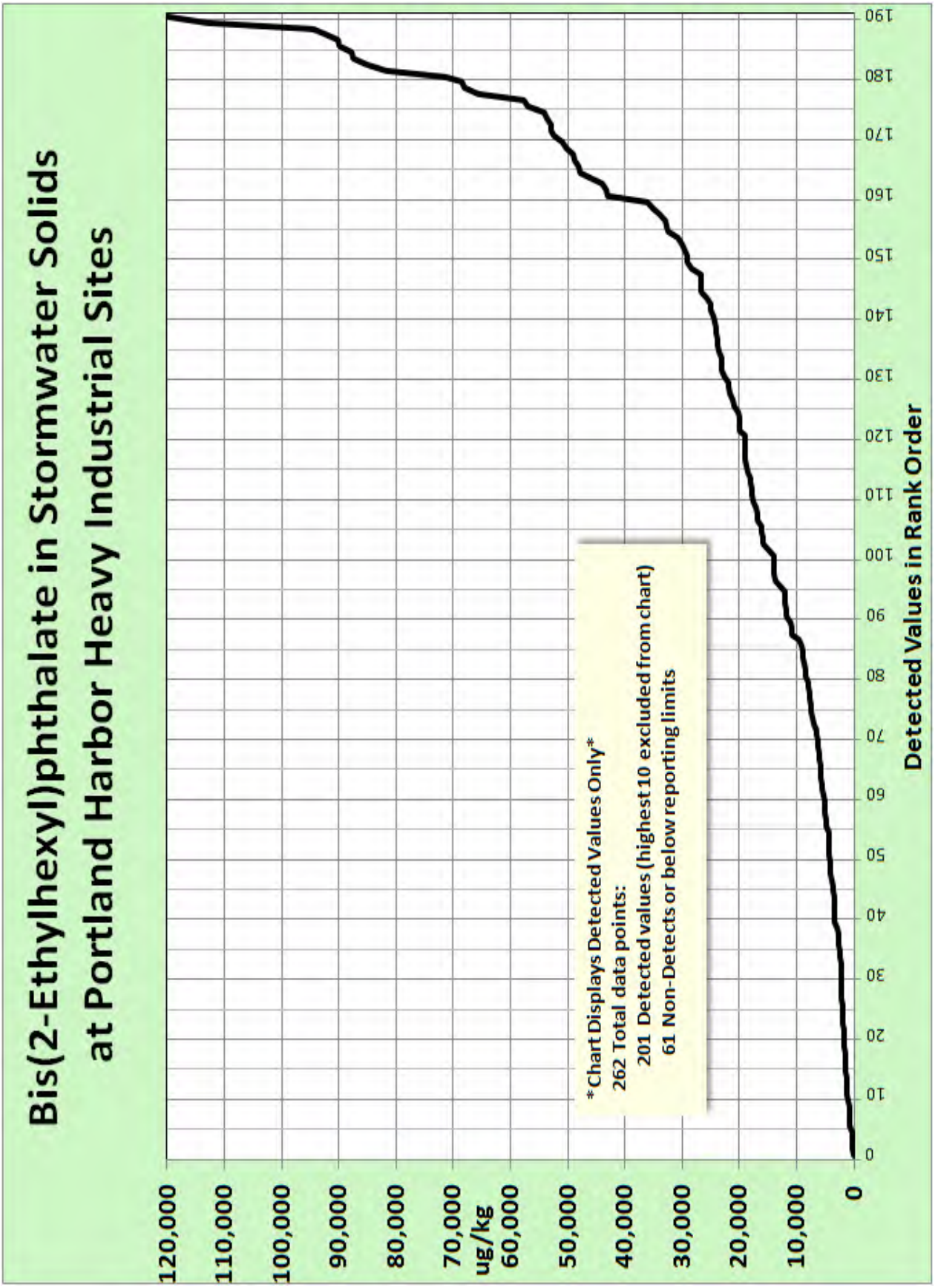
ZINC

SEDIMENT CHARTS

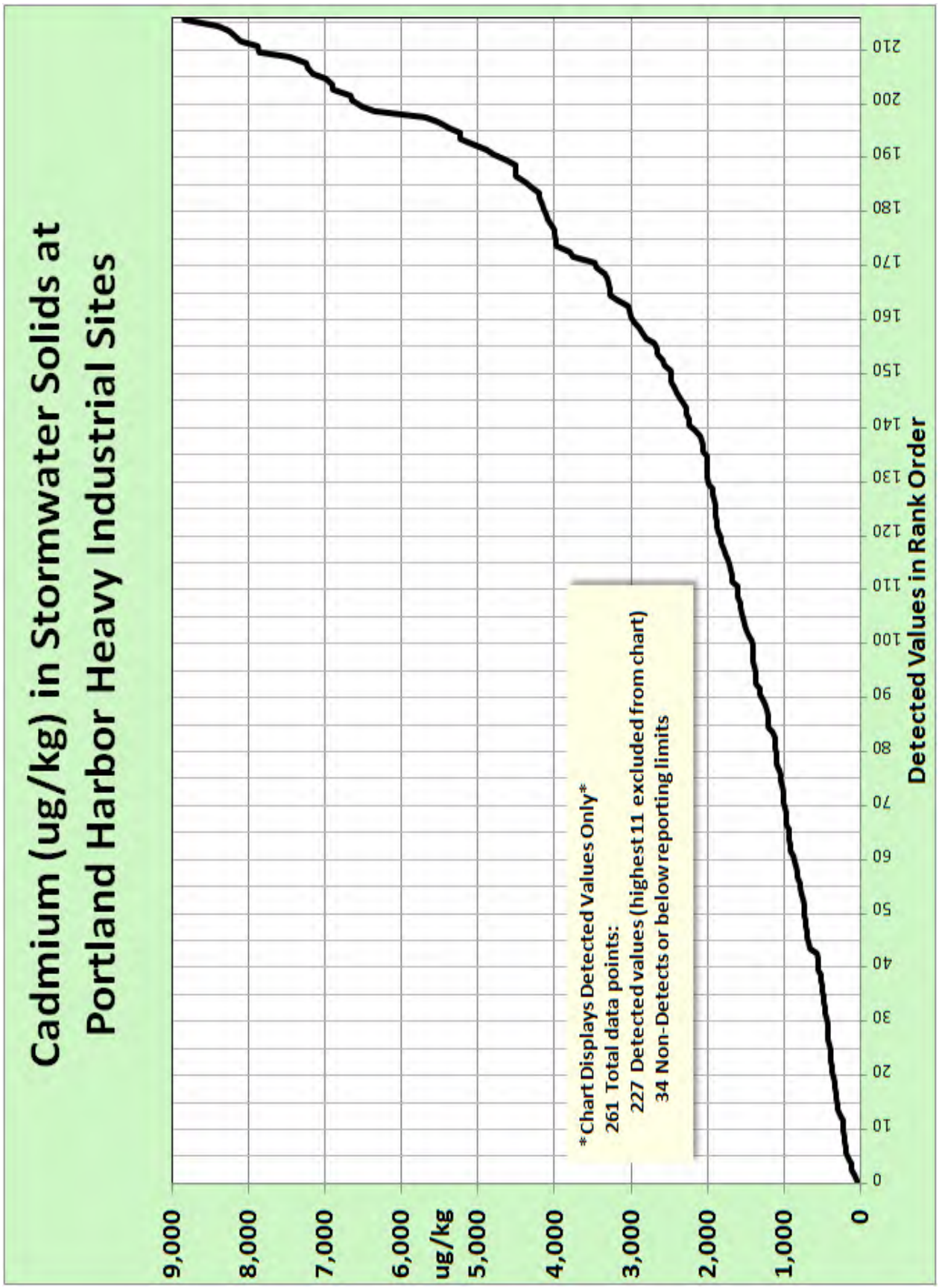
Data used to create the charts include catch basin sediment samples and suspended sediment samples. Suspended sediment samples were collected in sediment traps placed within stormwater pipes for a minimum of three months during the rainy season.


Arsenic (ug/kg) in Stormwater Solids at Portland Harbor Heavy Industrial Sites
Detected Values in Rank Order
ug/kg
50,000
45,000
40,000
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
220
210
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
Chart Displays Detected Values Only
260 Total data points:
236 Detected values (highest 8 excluded from chart)
24 Non-Detects or below reporting limits

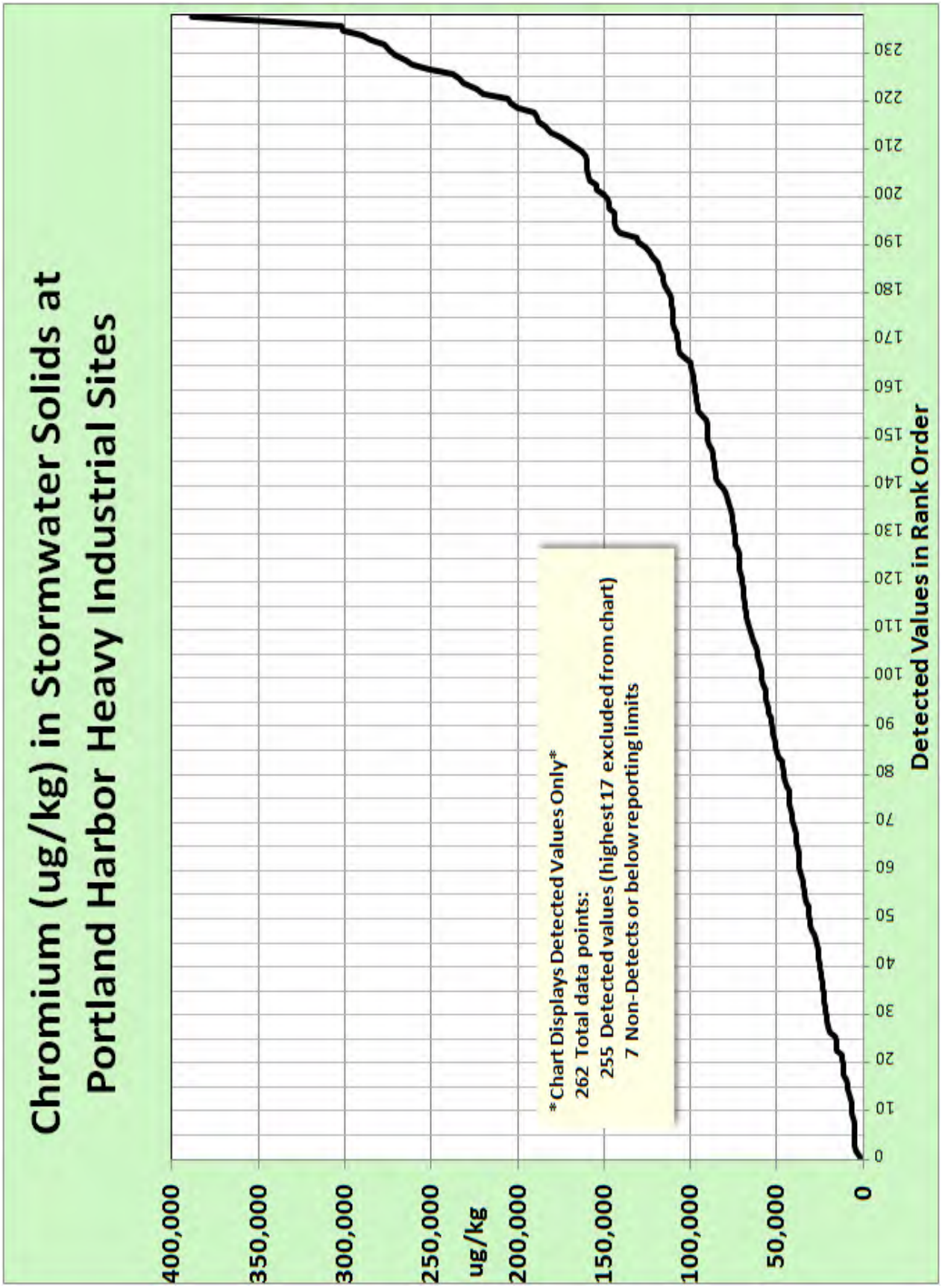
ARSENIC


Bis(2-Ethylhexyl)phthalate in Stormwater Solids
at Portland Harbor Heavy Industrial Sites
Chart Displays Detected Values Only
262 Total data points:
201 Detected values (highest 10 excluded from chart)
61 Non-Detects or below reporting limits
ug/kg
120,000
110,000
100,000
90,000
80,000
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
Detected Values in Rank Order
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0

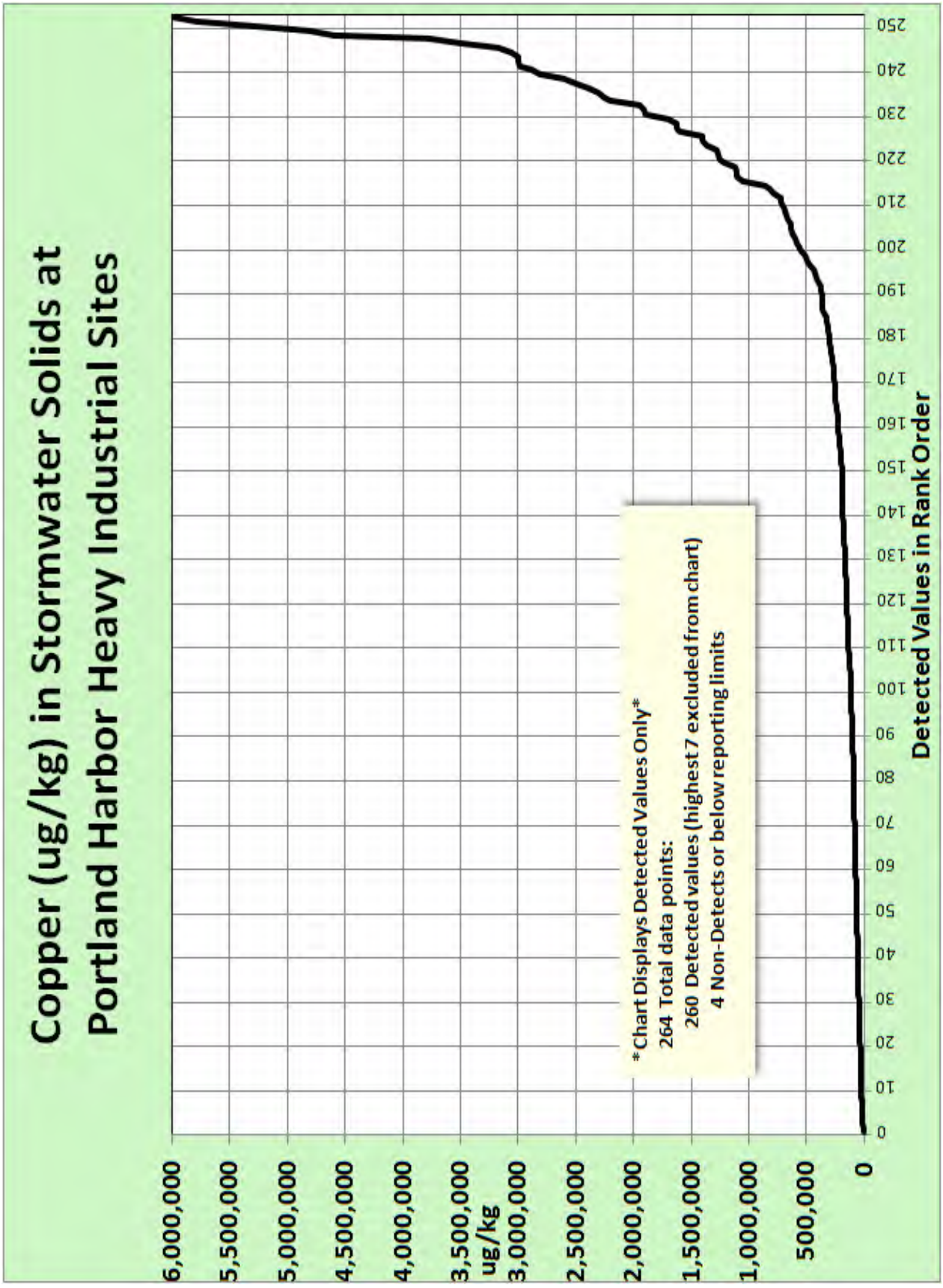
BEHP


Cadmium (ug/kg) in Stormwater Solids at Portland Harbor Heavy Industrial Sites
9,000
8,000
7,000
6,000
ug/kg
5,000
4,000
3,000
2,000
1,000
0
Detected Values in Rank Order
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170
180
190
200
210
Chart Displays Detected Values Only
261 Total data points:
227 Detected values (highest 11 excluded from chart)
34 Non-Detects or below reporting limits

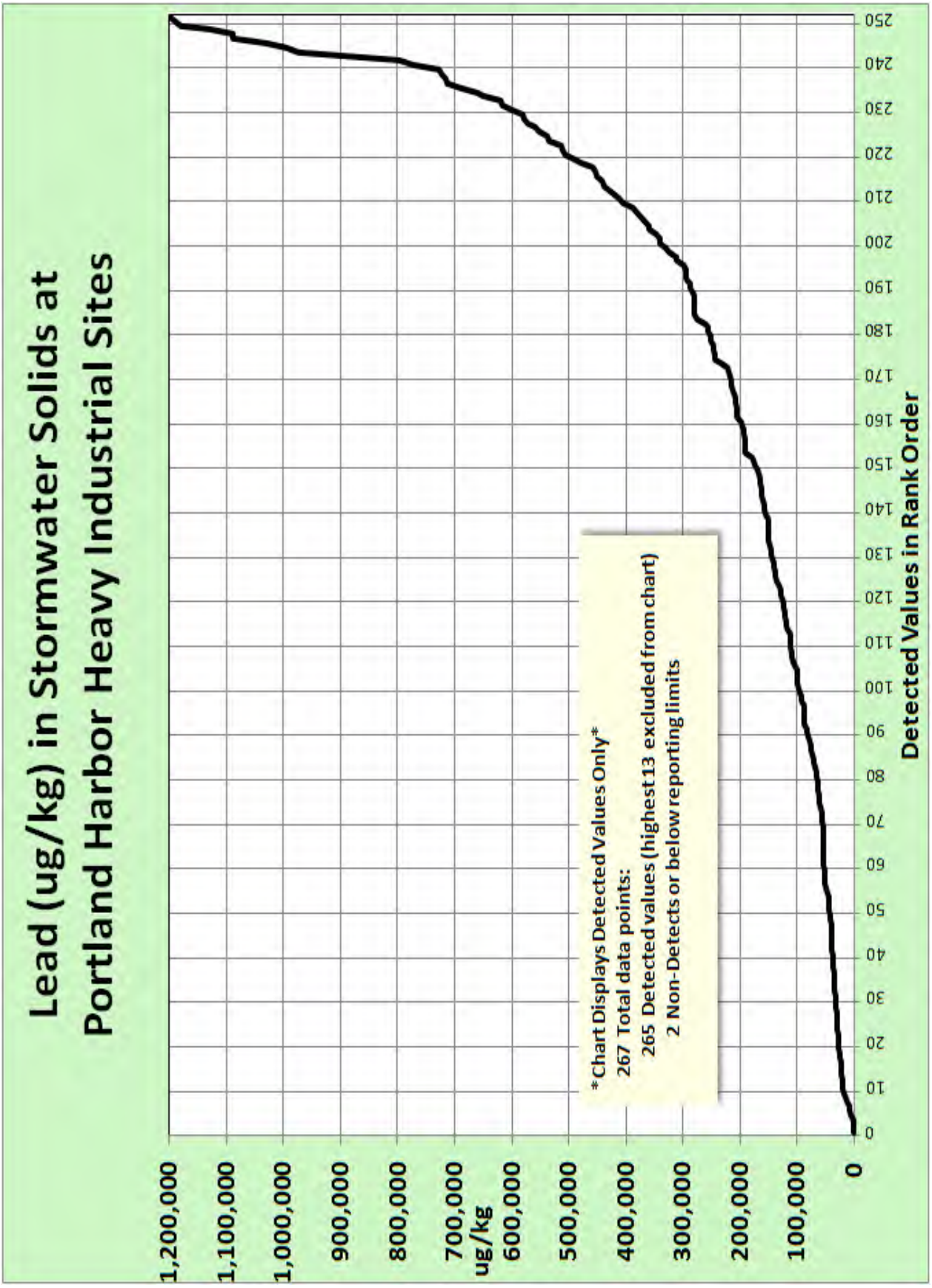
CADMIUM


Chromium (ug/kg) in Stormwater Solids at Portland Harbor Heavy Industrial Sites
Chart Displays Detected Values Only
262 Total data points:
255 Detected values (highest 17 excluded from chart)
7 Non-Detects or below reporting limits
ug/kg
400,000
350,000
300,000
250,000
200,000
150,000
100,000
50,000
0
Detected Values in Rank Order
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170
180
190
200
210
220
230

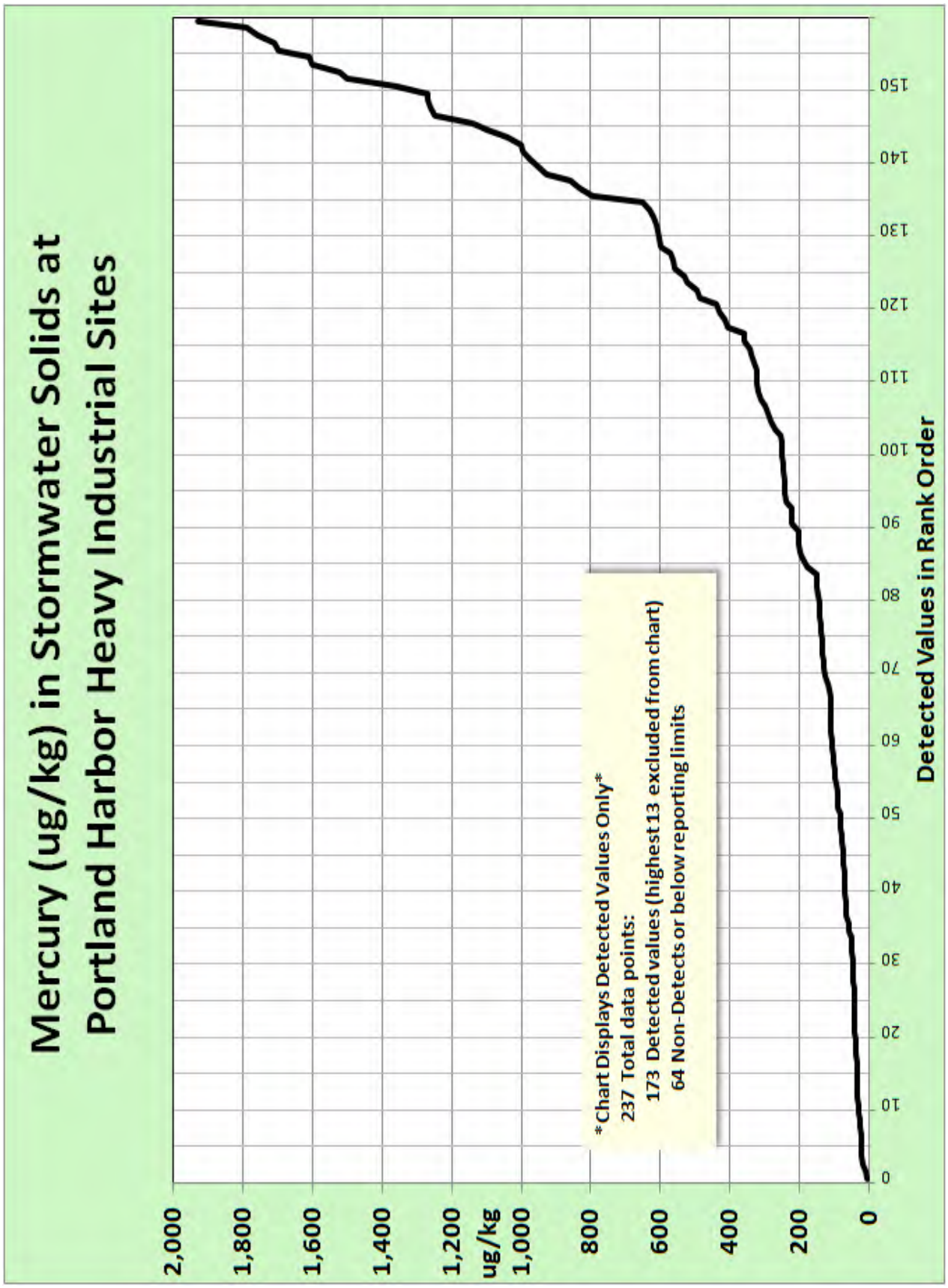
CHROMIUM


Copper (ug/kg) in Stormwater Solids at Portland Harbor Heavy Industrial Sites
Detected Values in Rank Order
ug/kg
6,000,000
5,500,000
5,000,000
4,500,000
4,000,000
3,500,000
3,000,000
2,500,000
2,000,000
1,500,000
1,000,000
500,000
0
250
240
230
220
210
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
Chart Displays Detected Values Only
264 Total data points:
260 Detected values (highest 7 excluded from chart)
4 Non-Detects or below reporting limits

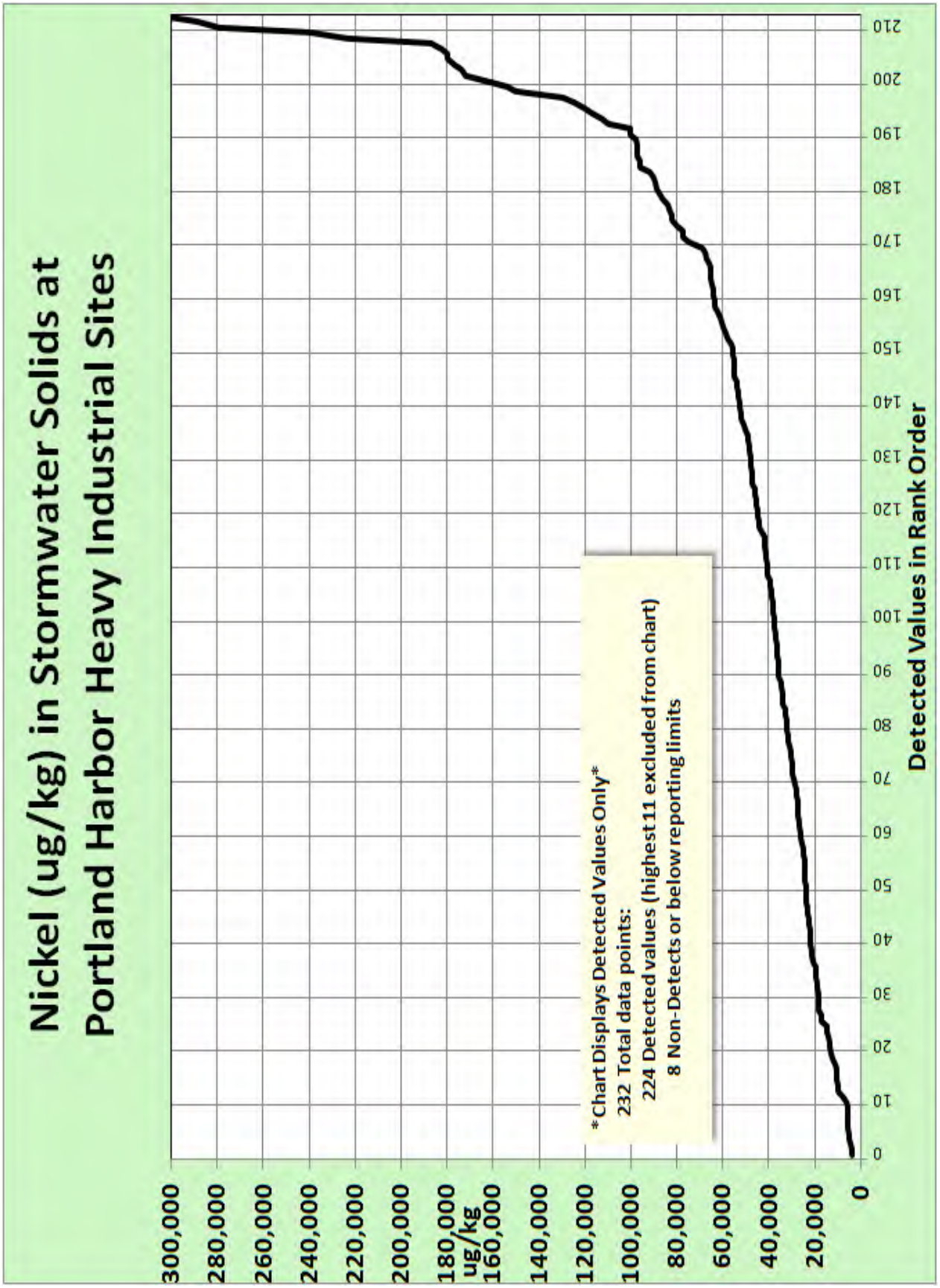
COPPER


Lead (ug/kg) in Stormwater Solids at Portland Harbor Heavy Industrial Sites
1,200,000
1,100,000
1,000,000
900,000
800,000
700,000
600,000
500,000
400,000
300,000
200,000
100,000
0
ug/kg
250
240
230
220
210
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
Detected Values in Rank Order
Chart Displays Detected Values Only
267 Total data points:
265 Detected values (highest 13 excluded from chart)
2 Non-Detects or below reporting limits

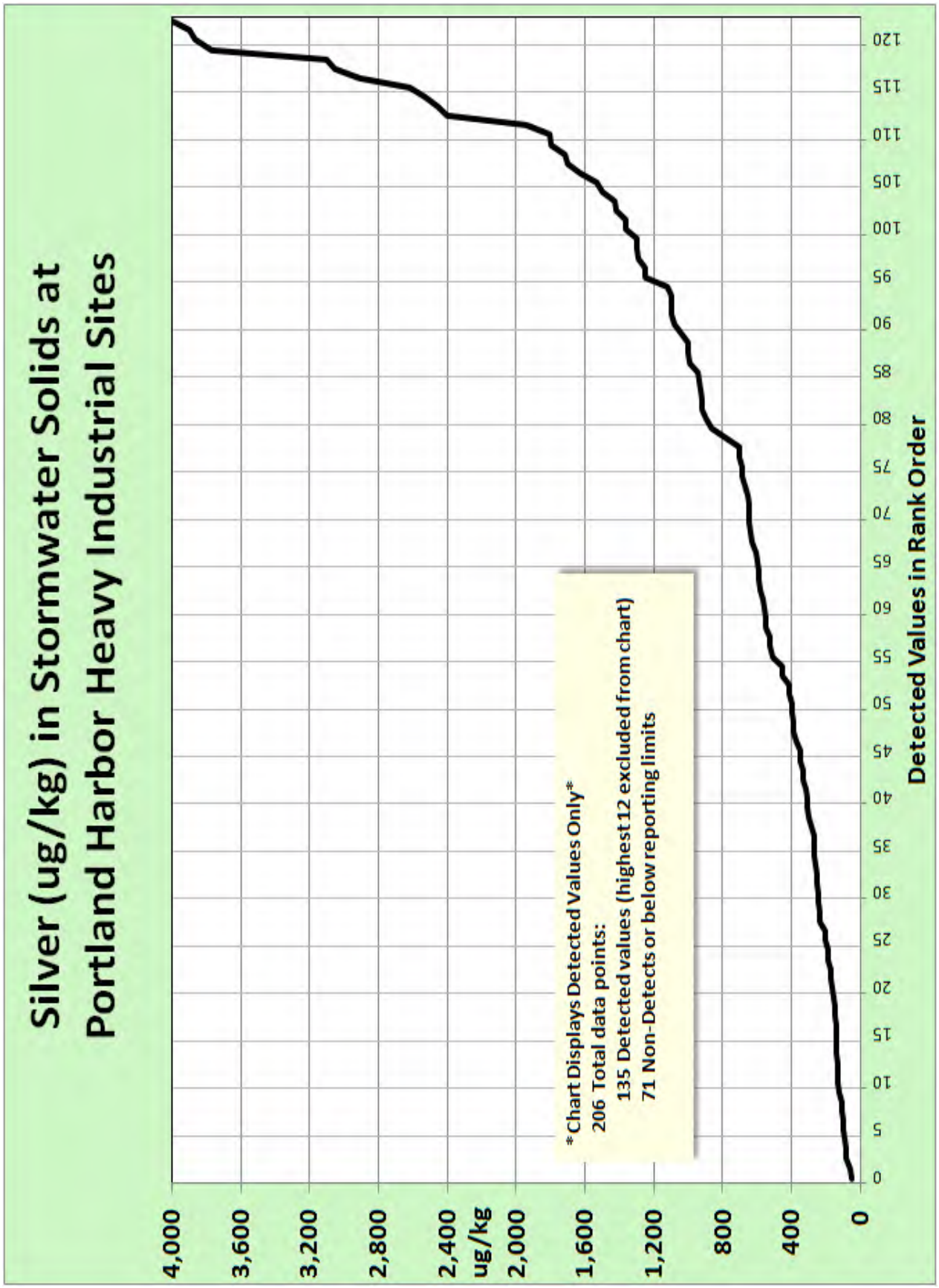
LEAD


Mercury (ug/kg) in Stormwater Solids at Portland Harbor Heavy Industrial Sites
ug/kg
2,000
1,800
1,600
1,400
1,200
1,000
800
600
400
200
0
Detected Values in Rank Order
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
Chart Displays Detected Values Only
237 Total data points:
173 Detected values (highest 13 excluded from chart)
64 Non-Detects or below reporting limits

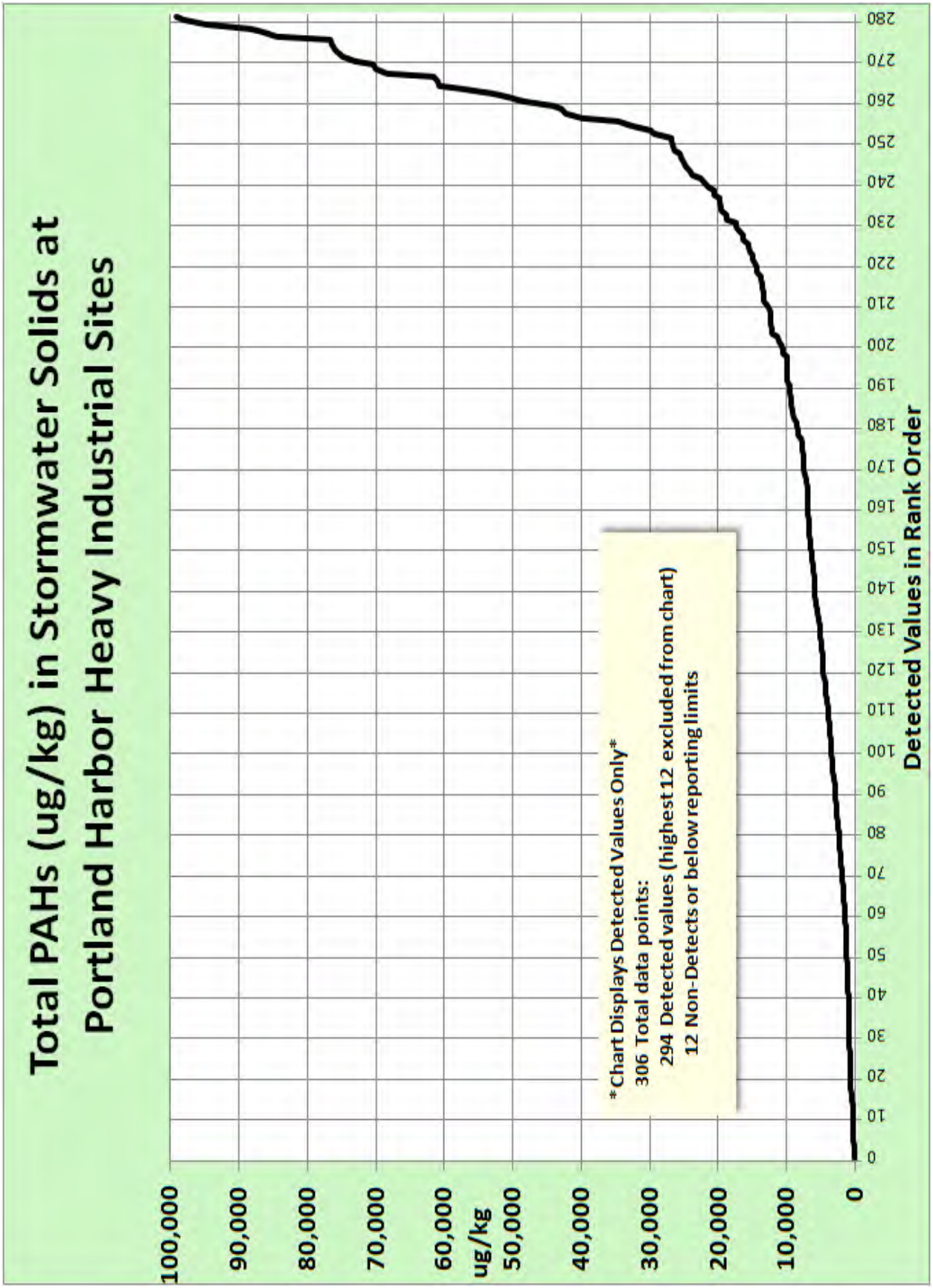
MERCURY


Nickel (ug/kg) in Stormwater Solids at Portland Harbor Heavy Industrial Sites
ug/kg
300,000
280,000
260,000
240,000
220,000
200,000
180,000
160,000
140,000
120,000
100,000
80,000
60,000
40,000
20,000
0
Detected Values in Rank Order
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170
180
190
200
210
* Chart Displays Detected Values Only*
232 Total data points:
224 Detected values (highest 11 excluded from chart)
8 Non-Detects or below reporting limits

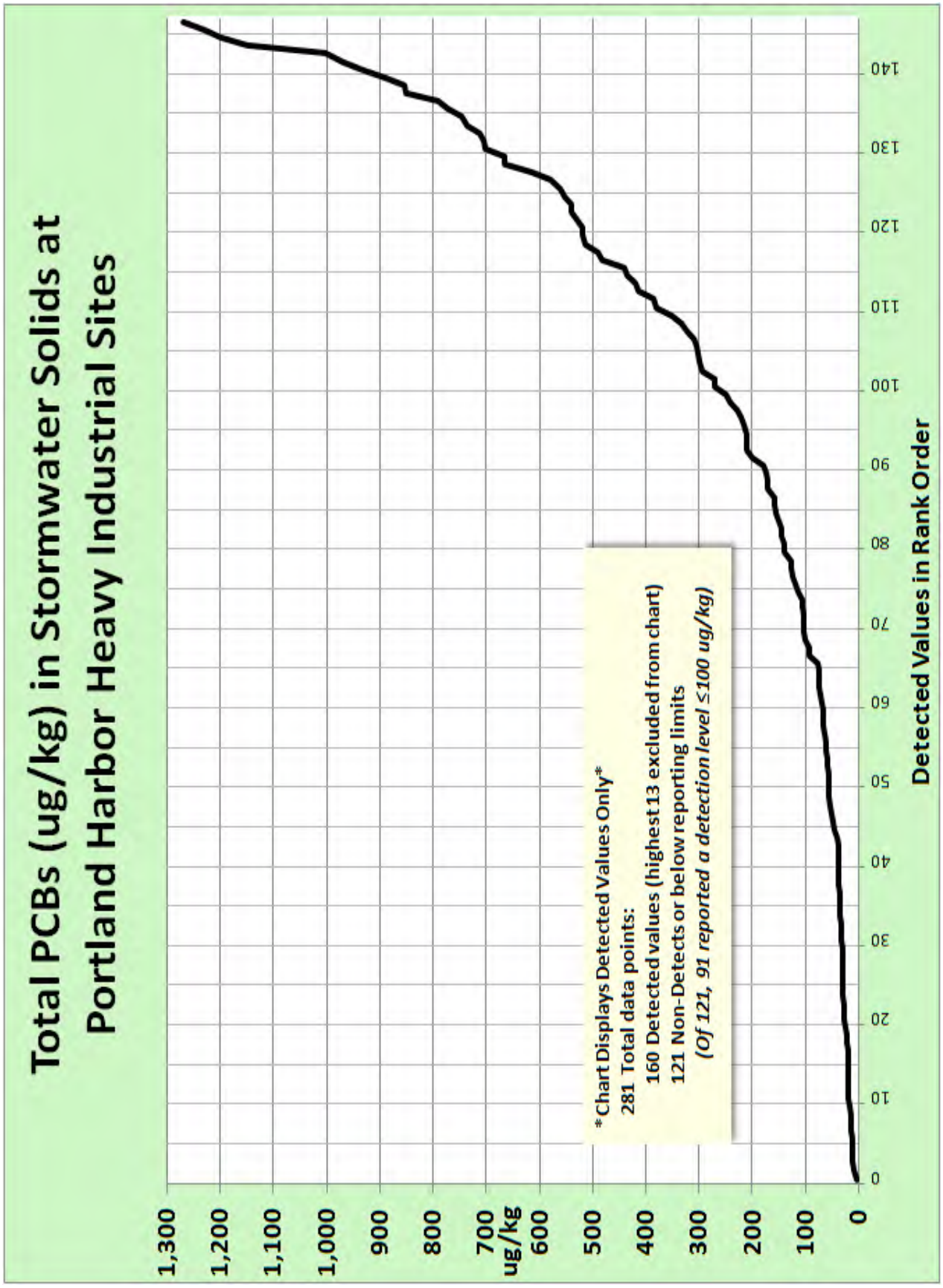
NICKEL


Silver (ug/kg) in Stormwater Solids at Portland Harbor Heavy Industrial Sites
4,000
3,600
3,200
2,800
2,400
2,000
1,600
1,200
800
400
0
ug/kg
Detected Values in Rank Order
Chart Displays Detected Values Only
206 Total data points:
135 Detected values (highest 12 excluded from chart)
71 Non-Detects or below reporting limits

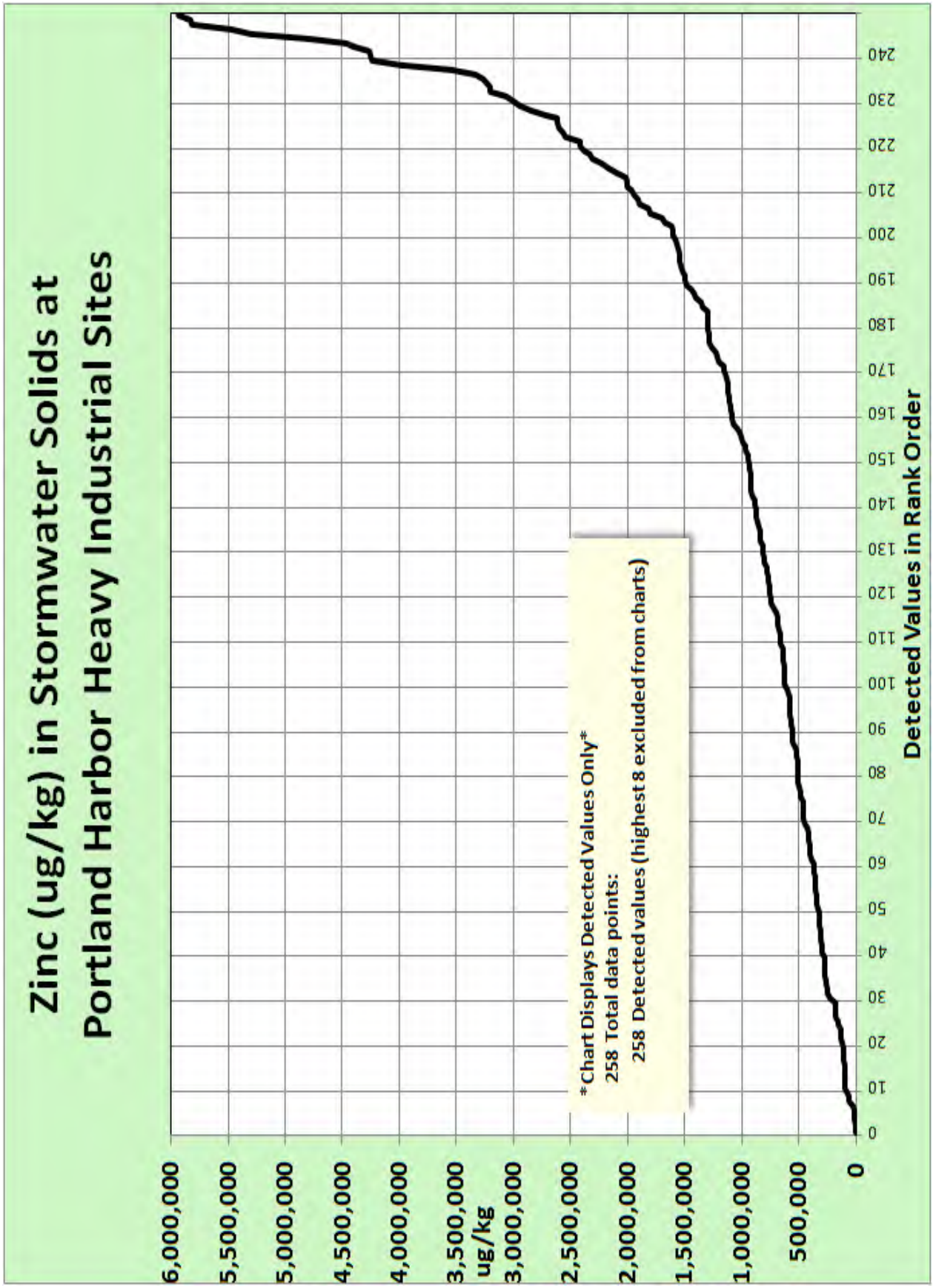
SILVER


Total PAHs (ug/kg) in Stormwater Solids at Portland Harbor Heavy Industrial Sites
Detected Values in Rank Order
ug/kg
100,000
90,000
80,000
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
280
270
260
250
240
230
220
210
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
* Chart Displays Detected Values Only*
306 Total data points:
294 Detected values (highest 12 excluded from chart)
12 Non-Detects or below reporting limits

TOTAL PAHs


Total PCBs (ug/kg) in Stormwater Solids at Portland Harbor Heavy Industrial Sites
1,300
1,200
1,100
1,000
900
800
700
600
500
400
300
200
100
0
ug/kg
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
Detected Values in Rank Order
* Chart Displays Detected Values Only*
281 Total data points:
160 Detected values (highest 13 excluded from chart)
121 Non-Detects or below reporting limits
(Of 121, 91 reported a detection level ≤100 ug/kg)

TOTAL PCBs


Zinc (ug/kg) in Stormwater Solids at Portland Harbor Heavy Industrial Sites
6,000,000
5,500,000
5,000,000
4,500,000
4,000,000
3,500,000
ug/kg
3,000,000
2,500,000
2,000,000
1,500,000
1,000,000
500,000
0
240
230
220
210
200
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
Detected Values in Rank Order
Chart Displays Detected Values Only
258 Total data points:
258 Detected values (highest 8 excluded from charts)

ZINC

EXHIBIT 3

ECSI No. 84
January 5, 2018
NW Natural Gasco Property

ANCHOR QEA

Stormwater Source Control Measures and Performance Monitoring Work Plan

Prepared for NW Natural

Exhibit 3-001

- **Human Direct Contact Screening Level Values.** The ROD cleanup level for carcinogenic polycyclic aromatic hydrocarbons (cPAH) is based on humans, including children, contacting and incidentally ingesting sediment on a public beach. The Gasco property is a secure and controlled industrial waterfront facility with signage posted along the shoreline to notify the public that there is no public access.

The ROD sediment cleanup levels are assigned the highest priority in the screening hierarchy and are highlighted in green. For chemicals with no ROD cleanup levels, JSCS sediment SLVs are assigned. JSCS SLVs based on benthic toxicity are highlighted in orange, and JSCS SLVs based on human health fish consumption (i.e., bioaccumulation-based SLVs) are highlighted in yellow.

3.2 Preliminary Stormwater Chemicals of Concern

Preliminary stormwater COCs are those chemicals with significant exceedances of applicable water quality SLVs that are also significantly elevated relative to other industrial sites in Portland Harbor. Preliminary stormwater COCs include the following (Table 3-1):

- **Polycyclic Aromatic Hydrocarbons.** Some of the heavier PAHs exceeded their chronic AWQC in stormwater. All of the carcinogenic PAHs exceeded their bioaccumulation SLVs in most samples. Cumulative distribution plots indicate PAH concentrations from the Gasco property are well above the median concentration for comparable industrial sites (Appendix C).
- **Benzene, Toluene, and Xylenes.** Benzene exceeded its bioaccumulation SLV in several stormwater sampling events. In one event (February 10, 2010), benzene, toluene, and xylene exceeded their chronic AWQC.
- **Cyanide.** Weak acid dissociable cyanide exceeded its chronic AWQC in one sampling event, but free cyanide was not detected in any events. Therefore, this COC is of lower concern.

Stormwater chemicals that were screened out because they were either not detected or not elevated compared to natural background or other industrial sites include the following:

- **Arsenic.** Total and dissolved arsenic commonly exceeded the Portland Harbor cleanup level, which is based on a drinking water exposure scenario that does not currently exist for the Willamette River and is not expected to exist in the foreseeable future. In addition, the cleanup level is two orders of magnitude lower than natural background concentrations. All dissolved and all but one total arsenic concentrations (an unconfirmed field duplicate from February 10, 2010) are well below the natural background concentration established by DEQ (DEQ 2011).
- **Copper and Zinc.** Copper and zinc concentrations at the site are commonly above chronic AWQC in both total and dissolved fractions, though at relatively low exceedance ratios (mostly less than two times the chronic AWQC). However, based on the cumulative

discharged directly to receiving waters via overland flow. Existing SCMs to control this pathway include resurfacing of the LNG Plant and former administration area with clean gravel and paving and StormFilter treatment of the Main Groundwater Treatment Plant area. Proposed SCMs include regrading and resurfacing projects to better manage stormwater flow and eliminate overland flows and enhanced use of on-site infiltration.

- **Infiltration of Contaminated Groundwater into Stormwater Conveyances.** Based on a comparison of storm drain elevations and seasonal high groundwater elevations, this does not appear to be a pathway of concern, as described in Section 2.4. However, this will be confirmed with dry-weather observations at Outfall 107 and the 15-inch CMP at the head of the Doane Creek drainage. In the past, contaminated groundwater seeping into the LNG tank basin has been commingled with site stormwater and discharged to Outfall 107, but this commingled water was routed to the sanitary sewer from 2007 to 2014 and subsequently routed to the GTS. Similarly, contaminated groundwater seeping into the Koppers tank basin is commingled with stormwater and until recently was diverted to the sanitary sewer. As part of the Koppers site demolition activities, stormwater is being segregated from the tank basin to the extent practicable and is planned to be infiltrated on site.
- **Preferential Pathways of Groundwater Transport Along Utility Lines.** Based on a comparison of utility elevations and seasonal high groundwater elevations, this does not appear to be a pathway of concern, as described in Section 2.4. However, this will be confirmed with dry-weather observations at Outfall 107 and the 15-inch CMP at the head of the Doane Creek drainage.
- **Residual In-Line Storm Sediments.** Residuals from past discharges may persist in site storm drains and continue to impact stormwater quality. However, in-line residuals are expected to have decreased over time as a result of stormwater BMP implementation (e.g., routine catch basin cleaning in the LNG Plant and PacTerm operations areas) and SCMs (e.g., diversion of commingled stormwater and groundwater to the sanitary sewer or the GTS). In addition, a majority of the influent storm lines are force mains that prevent in-line sediment accumulation. Recently, a sag in the gravity line along the northern side of the LNG tank basin was identified and contains a significant sediment buildup; this line will be cleaned, and the flow will be re-established using a pump and force main. These measures are discussed in Section 4.3.

3.5 Source Control Data Needs

Source control data needs for the Gasco property include the following:

- **Updated Stormwater Monitoring.** Existing site stormwater and storm solids data collected from 2007 through 2010 may not be representative of current conditions, given the stormwater BMPs and SCMs that have been implemented since these samples were collected (Section 2.5), and any preliminary conclusions regarding site COCs and sources of

contamination should first be verified with updated monitoring data. Monitoring of Outfall 107 would be coordinated with the forthcoming 1200-Z permit administered by BES. If current stormwater data exceeds NPDES Tier I/Tier II trigger concentrations or is significantly elevated relative to other industrial sites in Portland Harbor, additional source tracing work would be initiated. This additional work would include sampling of storm solids in upstream catch basins.

- **Groundwater Modeling Analysis of Koppers Area Infiltration (Subbasin A).** The stormwater discharge pipe from the Koppers tank basin to the City of Portland sanitary sewer has been disconnected. After removal or abandonment of the remaining stormwater infrastructure and partial removal of impervious surfaces, stormwater in the Koppers area will be managed by on-site infiltration to the extent feasible. Groundwater modeling analysis of the Fill WBZ will be conducted in the Koppers area to determine the potential effect that additional stormwater infiltration may have on the transport of shallow groundwater and its associated contaminant load. The results of this analysis will be used to inform the design of stormwater SCMs in this area, including the size and placement of infiltration facilities.
- **Monitoring of Dry Weather Flows.** As discussed in Section 2.4, the elevations of known site utilities appear to be well above seasonal groundwater elevations and are not expected to serve as preferential groundwater flow paths. However, the elevation of the abandoned former stormwater outfall on the site shoreline and the configuration of abandoned stormwater structures in the Koppers area are not well documented. Therefore, Outfall 107, the location of the former stormwater outfall approximately 100 feet downstream of Outfall 107, and the 15-inch CMP at the head of the Doane Creek drainage will be monitored during dry-weather conditions for evidence of possible dry-weather flows in the pipes and the bedding material surrounding the pipes.

pathway for stormwater that infiltrates in this primarily gravel area and then migrates in or around the 15-inch CMP. Such potential subsurface discharges should be prevented by formally decommissioning the existing 15-inch CMP outfall. Removal of existing buried catch basins and pipes within the Koppers area and NW Natural Mixing Station is not feasible, given the safety concerns associated with the high density of electrical and natural gas utilities in this area of the site and the uncertainty regarding the location of the inactive stormwater infrastructure and whether or not it has already been removed. Therefore, decommissioning by plugging the 15-inch CMP outfall pipe with controlled-density fill material and capping the pipe is recommended.

The smoke testing results discussed in Section 2.2.2 revealed that the 15-inch CMP is connected to stormwater inlets APW704 and APW706 between Highway 30 and the BNSF Railway Company railroad tracks. Inlets APW704 and APW706 appear to be inactive inlets that are no longer connected to the active stormwater drainage features in Highway 30 via stormwater manhole APQ383. Based on field investigations, these inlets drain a very small area of ditch between the highway and railroad tracks. Coordination with the Oregon Department of Transportation and/or the City of Portland will be needed to verify the status of inlets APW704 and APW706 and complete the decommissioning.

The pipe decommissioning documentation should include verification that there are no remaining stormwater migration pathways from the Gasco Property to Doane Creek, the sanitary sewer system, or the municipal stormwater sewer system. Wet-weather and dry-weather observations will be conducted to verify that this pathway has been eliminated. Wet-weather observations will be coordinated with 1200-Z permit monthly site inspections, and dry-weather observations will be scheduled in the spring and early summer months during seasonal high groundwater conditions. One year of monthly observations after outfall decommissioning will be used to determine whether the pathway has been eliminated (Section 5.4).

4.6 Design and Implementation Timeline

Proposed stormwater SCMs are planned for design and implementation in 2018, although permitting requirements and other factors may delay the completion of some measures until 2019. Some proposed stormwater SCMs are prioritized for the first quarter of 2018. These SCMs include focused regrading around the PacTerm north tank basin and shoreline access road, the catch basin retrofit near the PacTerm south tank basin, and the disconnection of roof downspouts and pipe decommissioning in the NW Natural Mixing Station. The design and implementation timeline for each proposed stormwater SCM is detailed in Table 4-2.

4.7 Coordination with 1200-Z Permit Requirement Activities

It is anticipated that the Gasco Property will receive 1200-Z permit coverage in early 2018. This permit requires the use of stormwater source control BMPs, including but not limited to spill prevention and control, minimization of exposure of materials to stormwater, preventive

maintenance, and good housekeeping practices. These stormwater source control BMPs are already in use throughout the site's operational areas and will be monitored via the monthly site inspections as part of permit compliance activities.

Performance monitoring of the implemented stormwater SCMs will also be integrated into the monthly site inspections that are required by the 1200-Z permit. Performance monitoring is discussed in Section 5.

4.8 Timeline for Achieving Stormwater Source Control Objectives

The overall objectives of the proposed interim stormwater SCMs are to manage on-site stormwater and control off-site stormwater discharges. As described in Section 4.6, the implementation of the majority of the proposed interim stormwater SCMs is expected to be completed in 2018, assuming there are no regulatory or permitting delays.

Stormwater management is expected to be improved within a few weeks of completion of proposed regrading and infiltration facility construction. Specific indicators that design objectives have been achieved include reduced ponding in the areas shown in Figure 2-4, reduced run-in flows to the PacTerm tank basins, and reduced ponding and overland flows along the site shoreline.

Ongoing stormwater source control BMPs required by the 1200-Z permit will continue to be implemented throughout the site to prevent stormwater from coming into contact with potential pollutants. The effectiveness of these BMPs will be continually assessed through stormwater monitoring activities and monthly inspections.

EXHIBIT 4

DEQ USE ONLY
File #:
Application #:
LLID/RM:
River Mile:
Legal Name Confirmed: ☐
Notes:

State of Oregon Department of Environmental Quality

DEPARTMENT OF ENVIRONMENTAL QUALITY APPLICATION FOR NEW NPDES GENERAL PERMIT 1200-COLS and 1200-Z

DEQ USE ONLY
Date Received:
Amount: $
Check #:
Check Name:
Deposit #:
Receipt #:
Notes:

A. REFERENCE INFORMATION

1. Legal Name: Northwest Natural Gas Company
2. Common Name: NW Natural Gasco Property
3. Facility Physical Address: 7900 NW St. Helens Road
   City, State, Zip Code: Portland, OR 97210
   County: Multnomah
4. Site Location by Latitude and Longitude:
   Latitude: 45 / 34 / 44 Degrees/Minutes/Seconds
   Longitude: -122 / 45 / 30 Degrees/Minutes/Seconds
5. Primary SIC code and Title: Permit Table 2, Add'l. Activities
   Additional SIC Codes: 4923, 4924, 4953
6. Is the applicant the owner of the facility? ■ Yes ☐ No
7. Legal Contact : Robert J. Wyatt Telephone #: 503-226-4211 Email: rjw@nwnatural.com
   Mailing Address: 220 NW Second Avenue City, State, Zip Code: Portland, OR 97209
8. Facility Contact: Robert J. Wyatt Telephone #: 503-226-4211 Email: rjw@nwnatural.com
   Mailing Address: 220 NW Second Avenue City, State, Zip Code: Portland, OR 97209
9. Invoice to: Robert J. Wyatt Telephone #: 503-226-4211 Email: rjw@nwnatural.com
   Billing Address: 220 NW Second Avenue City, State, Zip Code: Portland, OR 97209

B. STORMWATER DISCHARGE INFORMATION

1. Briefly describe the various activities that take place on your site that may result in industrial pollutants contaminating stormwater runoff from the site:

   See Attachment 1.

2. Receiving waterbody: List the name(s) of the water(s) that receive stormwater from your facility: Willamette River, Doane Creek

   ■ Direct Discharge

   ■ Indirect Discharge through a Municipal Storm Sewer or Drainage System (MS4), ditch, infiltration device or other manmade conveyance system

3. Is your facility discharging stormwater to a waterbody that is impaired without a Total Maximum Daily Load (TMDL):
   ■ Yes ☐ No

   If you answered Yes to the previous question, you must provide the additional information with your application to obtain coverage under this permit:

   i. Prevent all exposure to stormwater of the pollutant(s) for which the waterbody is impaired and document in the Stormwater Pollution Control Plan (SWPCP) procedures taken to prevent exposure onsite
   ii. Document in SWPCP that the pollutant(s) for which the waterbody is impaired is not present at the site, or
   iii. Provide data and other technical information that demonstrates that the discharge is not expected to cause or contribute to an exceedance of the water quality standard for which the waterbody is impaired at the point of discharge to the waterbody if the pollutant(s) for which the waterbody is impaired are likely to be present at the site and DEQ has not issued a TMDL for the pollutant(s). See SWPCP, Section 2.3.

   See Attachment 2.

   Has any stormwater analytical data been collected for the site? ■ Yes (If Yes, please attach the Laboratory Results sheets.) ☐ No

4. Have all stormwater outfalls associated with industrial activities on your site been evaluated for the presence of non-stormwater discharges not otherwise authorized by this permit or another NPDES permit?

See Attachment 1.

If unauthorized or unpermitted non-stormwater discharges were discovered during the investigation, please list the wastewater source(s):

See Attachment 1.

By signing this application, you certify that this investigation has occurred and there are no unauthorized or unpermitted discharges.

5. Have any leaks or spills or other instances of stormwater contamination occurred at the site within the last three (3) years?
☒ Yes ☐ No If Yes, please describe below:

See Attachment 1.

6. Are there other DEQ water quality permits issued for this site? ☒ Yes ☐ No If Yes, please describe the permits and provide the permit No(s): NPDES Individual Permit No. 103061; NPDES General 100-J Permit (DEQ File No. 62231)

Are you using any stormwater outfalls on site to discharge permitted wastewater? If so, describe:

Yes. Treated groundwater and stormwater is discharged from the site to the Willamette River via Outfall 001 as authorized by NPDES Individual Permit No. 103061. Non-contact cooling water is discharged once annually via Outfall 107 under NPDES General 100-J Permit (DEQ File No. 62231).

C. LAND USE COMPATABILITY STATEMENT

Attach the *original* and complete Land Use Compatibility Statement (LUCS) signed by the local land use authority. The application will not be processed unless the local land use authority approves it and it meets statewide planning goals.

D. SIGNATURE OF LEGALLY AUTHORIZED REPRESENTATIVE

I hereby certify that the information contained in this application is true and correct to the best of my knowledge and belief. In addition, I agree to pay all permit fees required by Oregon Administrative Rules 340-45. This includes a renewal application fee to renew the permit and a compliance determination fee invoiced annually by DEQ to maintain the permit.

Tom Imeson	Vice President, Public Affairs
Name of Legally Authorized Representative (Type or Print)	**Title**
Tom Imeson	29 November 2017
Signature of Legally Authorized Representative	**Date**

E. APPLICATION SUBMITTAL

The following application materials must be completed and submitted to the DEQ regional office or to a DEQ Agent (see instructions for list of DEQ regional office and Agents):

☐ Signed Application form.
☐ Land Use Compatibility Statement with signature of the local land use planning official and the LUCS Findings, if applicable.
☐ Stormwater Pollution Control Plan and Checklist.
☐ Application fee. Effective 1/4/2016, the fee is $1,932 (includes $952 for new permit application and $980 for first year annual fee). Make the check payable to DEQ.

If you are sending your application to a DEQ Agent, check with the DEQ Agent for the appropriate fees and make check payable to the DEQ Agent.

Instructions for completing this form:
Please answer all questions. An incomplete application will not be processed.
If the information requested is not applicable, please indicate as such.

A. REFERENCE INFORMATION:

1. Enter the legal name of the applicant. This must be the legal Oregon name (i.e., Acme Products, Inc.) or the legal representative of the company if it operates under an assumed business name (i.e., John Smith, dba Acme Products). The name must be a legal, active name registered with the Oregon Department of Commerce, Corporation Division (503) 378-4752, (http://egov.sos.state.or.us/br/pkg_web_name_srch_inq.login), unless otherwise exempted by their regulations. The permit will be issued to the legal name of the applicant.
2. Enter the common name of the facility or operation if different than the legal name.
3. Enter the physical location of the facility (not mailing address), including city, state, zip code, and county.
4. Enter the latitude and longitude of the approximate center of the facility or site in degrees/minutes/seconds to the nearest 15 seconds. Latitude and longitude can be obtained from DEQ's location finder web site at http://deq12.deq.state.or.us/website/findloc/data.asp. To get the longitude and latitude to appear you can also zoom in and re-center until you find the area. You may want to turn off DEQ interests to eliminate the yellow dots and you may want to turn on the Aerial Photos to help you locate the site (note that the aerial photos are over ten years old). The latitude and longitude will be indicated on the left side of the page once you have checked the locate place at the top of the page and clicked on a location.
5. Provide the primary Standard Industrial Classification (SIC) Code and Title for the facility and any additional SIC Codes that apply to the site. The SIC Code is a four digit number assigned to different businesses. The SIC Title corresponds to the Code and is a short description of activities that occur at a business. Typically, SIC Codes are used by the fire marshal or insurance companies. They are also used when filing taxes or registering as a corporation with the state. This may or may not be the SIC Codes(s) that you will use. The SIC Code must be the one(s) that pertain to the site industrial activities and may differ from that used for other purposes. If you do not know your SIC Code and Title, try the OSHA Web Site at http://www.osha.gov/pls/imis/sic_manual.html or contact DEQ or Agent office for assistance.
6. Indicate if the applicant is the owner of the facility.
7. Enter the name, telephone number, and mailing address of the Legal Contact. The Legal Contact is the person that receives official correspondence from DEQ, such as renewal notices or notices of noncompliance, and may be contacted if there are questions about this application.
8. Enter the name, telephone number and mailing address of the Facility Contact if different from the Legal Contact. The Facility Contact is the person located at the facility that has specific knowledge of the facility or operation under permit (e.g., the treatment plant operator), and may be contacted if there are specific questions about this application.
9. Enter invoicing information for billing purposes if different from the Legal Contact (e.g., "Invoice To: Business Office - Accounts Payable"). This must be the same company as the applicant.

B. STORMWATER DISCHARGE INFORMATION:

1. Briefly describe the activities at the site that have the potential to contaminate stormwater. Such activities include the storage of materials or equipment outside, unloading and loading activities, maintenance activities, etc.
2. Indicate the name(s) of the receiving water(s) that industrial stormwater from your facility will discharge to. Your receiving water may be a lake, stream, river, wetland or other waterbody, and may or may not be located adjacent to your facility. Your stormwater may discharge directly to the receiving water or indirectly via a storm sewer system, an open drain or ditch, or other conveyance structure. Do NOT list a man-made conveyance, such as a storm sewer system, as your receiving water. Indicate the first natural receiving water your stormwater discharge enters. For example, if your discharge enters a storm sewer system, that empties into Trout Creek, which flows into Pine River, your receiving water is Trout Creek, because it is the first natural waterbody your discharge will reach. Similarly, a discharge into a ditch that feeds Spring Creek should be identified as "Spring Creek" since the ditch is a manmade conveyance. If you discharge into a municipal separate storm sewer system (MS4), you must identify the waterbody into which that portion of the storm sewer discharges. That information should be readily available from the operator of the MS4.
3. Determine if stormwater from your site will discharge to an impaired waterbody and identify the impairment pollutant(s) if the answer is yes. You can find this information by searching the database at: https://www.oregon.gov/deq/wq/Pages/WQ-Assessment.aspx. When searching the database, be sure the waterbody selected is in the correct watershed (basin) and choose Water Quality Limited TMDL needed – 303(d) (Category 5).

   If you answered yes to the question and discharge to an impaired water without a TMDL you must cease discharge, obtain an individual permit or meet the following conditions:

   i. Document in your SWPCP that none of the pollutants of concern are present at the site;

ii. Prevent stormwater exposure to all of the pollutants of concerns and document in your SWPCP how exposure is prevented. For example, preventing stormwater exposure may include actions such as moving operations under cover, use of berms to divert stormwater, painting the roof or;
iii. Include in your SWPCP sample results or a technical report to demonstrate that the discharge is not expected to cause or contribute to an exceedance of the water quality standard for with the waterbody is impaired.

Indicate if any tests have been done on the facility's stormwater runoff associated with industrial activities on the site. Attach any sampling results that may be available.

4. The federal stormwater regulations (40 CFR 122.26(c)) require that your facility be investigated for the presence of non-stormwater discharges. Non-stormwater discharges are any discharges not associated with rain events such as discharges of wash water, boiler blowdown, non-contact cooling water, process wastewater, etc. Certain non-stormwater discharges are authorized under this permit (please see Schedule A, condition 5 of the permit).

   Please describe the method used to evaluate your site for the presence of non-stormwater discharges. Methods may include conducting a visual inspection of activities at the site during periods of dry weather to determine if there is any unusual drainage off the site; inspecting site plans or testing drainage lines to confirm that drains being used for non-stormwater discharges are connected to sanitary sewer (sewage treatment plant); or some combination of the above. By signing the application, you certify that such an investigation has been performed. Indicate if any non-stormwater discharges were found during the investigation that are not authorized by this permit or any other existing DEQ permit. For example, if flow was noted, describe the source of the non-stormwater discharge. At the time the application is reviewed, a determination will be made as to whether the non-stormwater discharge needs a permit.

5. Indicate if any leaks or spills of materials or wastes have occurred at the facility within the last three years.

6. Indicate if there are any other DEQ permits issued for this site. If so, please describe the permits and provide the permit numbers. Indicate if you are using any of the stormwater outfalls on site to discharge wastewater that is authorized under a different permit.

C. LAND USE COMPATABILITY STATEMENT:

Land Use Compatibility Statement (LUCS) must be signed by local planning official. If there are any conditions placed on the land use approval, the findings must be included. The LUCS form may be obtained from DEQ at: http://www.deq.state.or.us/pubs/permithandbook/lucs.htm.

D. SIGNATURE OF LEGALLY AUTHORIZED REPRESENTATIVE:

A legally authorized representative must sign the application. The following are authorized to sign the document:

- **Corporation** — President, secretary, treasurer, vice-president, or any person who performs principal business functions; or a manager of one or more facilities employing more than 250 persons or having gross annual sales or expenditures exceeding $25 million that is authorized in accordance to corporate procedure to sign such documents
- **Partnership** — General partner *[list of general partners, their addresses and telephone numbers]*
- **Sole Proprietorship** — Owner(s) *[each owner must sign the application]*
- **City, County, State, Federal, or other Public Facility** — Principal executive officer or ranking elected official
- **Limited Liability Company** — Member
- **Trusts** — Acting trustee *[list of trustees, their addresses and telephone numbers]*

E. APPLICATION SUBMITTAL:

Please send the following completed application materials to the appropriate DEQ regional office or Agents office: **Application form; Stormwater Pollution Control Plan (SWPCP); SWPCP checklist; Land Use Compatibility Statement (LUCS), and fees.** If applicable, also send a demonstration that your discharge does not or will not contribute to water quality impairments for any pollutant listed in Table 4, Schedule B.1 of the permit. For more information on preparing a SWPCP, please see DEQ's guidance document, located at http://www.oregon.gov/deq/Permits/Pages/LUCS.aspx. DEQ has entered into agreements with jurisdictions knows as "Agents" to process the permit applications and administer the permits on DEQ's behalf. If your project is located in one of these areas, please submit your application materials to the Agent, including one electronic and one paper copy of the SWPCP.

DEQ Northwest Region	DEQ Western Region		DEQ Eastern Region		
700 Lloyd Building at 700 NE Multnomah St., Suite #600, Portland, OR 97232 503-229-5263 or 1-800-452-4011	165 East Seventh Avenue, Suite 100 Eugene, OR 97401 541-687-7326 or 1-800-844-8467		800 SE Emigrant Avenue, Suite 330 Pendleton, OR 97801 541-278-4605 or 1-800-304-3513		
Clackamas	Benton	Lane	Baker	Hood River	Sherman
Clatsop	Coos	Lincoln	Crook	Jefferson	Umatilla
Columbia	Curry	Linn	Deschutes	Klamath	Union
Multnomah	Douglas	Marion	Gilliam	Lake	Wallowa
Tillamook	Jackson	Polk	Grant	Malheur	Wasco
Washington	Josephine	Yamhill	Harney	Marrow	Wheeler

AGENT OFFICES :

Clean Water Services 2550 SW Hillsboro Highway Hillsboro, OR 97123 503-681-5175 *Includes Banks, Beaverton, Cornelius, Durham, Forest Grove, Gaston, Hillsboro, King City, North Plains, Sherwood, Tigard, Tualatin, and portions of Washington Co.*	**City of Portland** Bureau of Environmental Services Water Pollution Control Laboratory 6543 N. Burlington Ave. Portland, OR 97203-5452 503-823-7584	**City of Eugene** Industrial Source Control 410 River Ave. Eugene, OR 97404 541-682-8616

Attachment 1
Responses to Application Fields B.1, B.4, and B.5

B. Stormwater Discharge Information

B.1. *Briefly describe the various activities that take place at your site that may result in industrial pollutants contaminating stormwater runoff from the site:*

Current site activities do not require a NPDES 1200-Z permit. NPDES 1200-Z permit coverage is required due to the inclusion of "any former activity that resulted in significant materials (as defined in Schedule D) remaining on site" in the 2017 NPDES 1200-Z permit Table 2: Additional Industrial Activities Covered.

Current activities occurring on site are described as follows:

- The NW Natural liquified natural gas (LNG) storage and distribution facility operations are located in the central portion of the Site. The SIC codes applicable to this facility are 4923 (natural gas transmission and distribution) and 4924 (natural gas distribution). This facility is used to liquefy natural gas for storage during times of low demand until the gas is needed during times of peak demand, typically during the winter heating season. In addition to the LNG storage tank, NW Natural maintains LNG storage control and distribution facilities at the site.
- The lease area for the former Koppers coal tar pitch distribution facility is located in the southern portion of the Site. Operations in this area have ceased; the tenant provided notice to NW Natural regarding the termination of their lease in June 2016. Demolition activities for this area are currently underway. There are currently no specific future development plans for this area.
- Site-wide groundwater and dense nonaqueous phase liquid (DNAPL) source control operations are conducted using a hydraulic control and containment (HC&C) system. The HC&C system includes a series of groundwater extraction wells, control wells, and monitoring wells; a force main conveyance system with pumps; a DNAPL recovery and collection system; and a groundwater treatment system (GTS) that includes two pretreatment plants and a main groundwater treatment plant that discharges final treated groundwater to the Willamette River under an NPDES Waste Discharge Permit (Permit No. 103061). The HC&C system prevents groundwater in the alluvium water-bearing zone from discharging to the river. The extraction, control, and monitoring wells of the HC&C system are located along the Site shoreline and in various locations throughout the Site, and the Main Groundwater Treatment Plant is located in Subbasin F in the northwestern corner of the Site. Residual materials generated by remedial response activities within the GTS and HC&C systems include solid waste, aqueous waste, and nonaqueous phase liquid (NAPL). Materials handled at the pretreatment plants include oil sump residuals and spent vapor-phase activated carbon. Materials handled at the Main Groundwater Treatment Plant include filter press solids, spent bag filters, and spent liquid-phase activated carbon. Chemical loading and unloading occurs

at the pretreatment plants and Main Groundwater Treatment Plant. Hazardous chemicals including sodium hypochlorite, sodium hydroxide, sulfuric acid, sodium sulfide, and diesel fuel are handled as part of the main groundwater treatment system (Anchor QEA 2016b).

- The eastern and northern areas of the Site are not in use and have little to no development.

B.4. *Have all stormwater outfalls associated with industrial activities on your site been evaluated for the presence of non-stormwater discharges not otherwise authorized by this permit or another NPDES permit? If unauthorized or unpermitted non-stormwater discharges were discovered during the investigation, please list the wastewater source(s):*

Yes. No unauthorized non-stormwater discharges are evident in the permit coverage area based on inspection of site plans and site observations.

B.5. *Have any leaks or spills or other instances of stormwater contamination occurred at the site within the last three (3) years?*

A spill of 11,400 gallons of gasoline occurred on the western edge of the Gasco property when a tanker truck crashed into railroad cars adjacent to Highway 30; the Oregon Department of Environmental Quality (DEQ) has since determined that no further action is required with regard to remediation of this release. Other isolated leaks and spills have occurred that have been fully addressed. In addition, impacts to stormwater on the Gasco site have been observed that are likely attributable to historical manufactured gas plant operations; the entire site has been characterized for DEQ under the Voluntary Cleanup Program, and a Feasibility Study is currently being developed.

Attachment 2
Stormwater Data

DEQ Application for New NPDES 1200-Z General Permit
Attachment 2: Gasco Stormwater Analytical Results

Location ID	LW3-WR107	LW3-WR107	LW3-WR107	LW3-WR107	LW3-WR107
Sample Date	3/26/2007	4/9/2007	4/18/2007	5/3/2007	5/21/2007
Type	Total	Total	Total	Total	Total
Conventional Parameters (mg/L)					
Cyanide	--	--	--	--	--
Cyanide, amenable	--	--	--	--	--
Cyanide, available	--	--	--	--	--
Cyanide, free	--	--	--	--	--
Cyanide, Weak acid dissociable (WAD)	--	--	--	--	--
Total organic carbon	**2.9**	**4.2**	**3.6**	**5.6**	**4.6**
Dissolved organic carbon	**5.2**	--	**3.6**	**4.8**	--
Total suspended solids	**10**	**20**	**28**	**36**	**26**
Metals (µg/L)					
Aluminum	**225**	**204 J**	**244 J**	**751**	--
Antimony	**0.26**	**0.34**	**0.33**	**0.282**	--
Arsenic	**0.271**	**0.817**	**0.631**	**1.32 J**	--
Cadmium	**0.07**	**0.113**	**0.115**	**0.120**	--
Chromium	**1.08**	**1.26**	**1.51**	**2.17**	--
Copper	**3.1**	**5.6**	**5.7**	**10.0**	--
Lead	**2.79**	**4.66**	**7.8 J**	**4.35**	--
Mercury	0.02 UJ	0.03 U	0.03 U	0.04 U	--
Nickel	**2.66**	**4.64**	**4.86**	**3.07**	--
Selenium	0.2 U	**0.2 J**	**0.3 J**	0.4 U	--
Silver	0.004 U	**0.013 J**	0.024 U	**0.25 J**	--
Vanadium	--	--	--	--	--
Zinc	**71.9**	**129 J**	**141**	**114**	--
Metals, Dissolved (µg/L)					
Aluminum	**46.8**	-- --	**37.6 J**	**9.1 J**	--
Antimony	**0.30**	-- --	**0.30**	**0.25**	--
Arsenic	**0.21**	-- --	**0.23**	**0.94**	--
Cadmium	**0.050**	-- --	**0.065**	**0.056**	--

DEQ Application for New NPDES 1200-Z General Permit
Attachment 2: Gasco Stormwater Analytical Results

Location ID	LW3-WR107	LW3-WR107	LW3-WR107	LW3-WR107	LW3-WR107
Sample Date	3/26/2007	4/9/2007	4/18/2007	5/3/2007	5/21/2007
Type	Total	Total	Total	Total	Total
Chromium	0.77 U	-- --	**0.80**	**0.66**	--
Copper	**2.1**	-- --	**3.2**	**6.2**	--
Lead	**0.17**	-- --	**0.35 J**	**0.08**	--
Mercury	0.02 UJ	-- --	0.03 U	0.06 U	--
Nickel	**2.02**	-- --	**2.96**	**1.77**	--
Selenium	0.2 U	-- --	0.2 U	0.4 U	--
Silver	0.003 U	-- --	0.026 U	0.03 U	--
Vanadium	--	--	--	--	--
Zinc	41.2 U	--	**86.1**	**70.1**	--
Volatile Organics (µg/L)					
Benzene	--	--	--	--	--
Ethylbenzene	--	--	--	--	--
m,p-Xylene	--	--	--	--	--
o-Xylene	--	--	--	--	--
Toluene	--	--	--	--	--
Polycyclic Aromatic Hydrocarbons (µg/L)					
2-Methylnaphthalene	0.017 U	0.021 U	0.042 U	--	0.027 U
Acenaphthene	**0.009 J**	**0.011 J**	**0.024**	--	**1.200**
Acenaphthylene	**0.044**	**0.120**	**0.140**	--	**0.120**
Anthracene	**0.038**	**0.190**	**0.091**	--	**0.230**
Benzo(a)anthracene	**0.098**	**0.180**	**0.340**	--	**0.680**
Benzo(a)pyrene	**0.200**	**0.300**	**0.570**	--	**0.930**
Benzo(b)fluoranthene	**0.250**	**0.410**	**0.660**	--	**1.100**
Benzo(g,h,i)perylene	**0.320**	**0.550**	**0.820**	--	**0.830**
Benzo(k)fluoranthene	**0.081**	**0.130**	**0.240**	--	**0.420**
Chrysene	**0.180**	**0.260**	**0.340**	--	**0.920**
Dibenzo(a,h)anthracene	**0.032**	**0.067**	**0.096**	--	**0.130**
Fluoranthene	**0.170**	**0.270**	**0.530**	--	**1.900**

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Attachment 2: Gasco Stormwater Analytical Results

Location ID	LW3-WR107	LW3-WR107	LW3-WR107	LW3-WR107	LW3-WR107
Sample Date	3/26/2007	4/9/2007	4/18/2007	5/3/2007	5/21/2007
Type	Total	Total	Total	Total	Total
Fluorene	0.009 U	**0.012 J**	**0.022**	--	**0.190**
Indeno(1,2,3-c,d)pyrene	**0.290**	**0.520**	**0.760**	--	**0.820**
Naphthalene	**0.050**	0.062 U	0.130 U	--	0.081 U
Phenanthrene	**0.057**	**0.099**	**0.200**	--	**0.580**
Pyrene	**0.210**	**0.310**	**0.730**	--	**2.000**
Total PAH (U = 0)	**1.78 J**	**3.02 J**	**4.90**	--	**11.0**
Phthalates (µg/L)					
Bis(2-Ethylhexyl)phthalate	--	--	--	--	--
Butylbenzyl phthalate	--	--	--	--	--
Diethyl phthalate	--	--	--	--	--
Dimethyl phthalate	--	--	--	--	--
Di-n-butyl phthalate	--	--	--	--	--
Di-n-octyl phthalate	--	--	--	--	--
Miscellaneous Semivolatiles (µg/L)					
Carbazole	--	--	--	--	--
Dibenzofuran	**0.005 J**	**0.006 J**	**0.010 J**	--	**0.063**
Herbicides (µg/L)					
Dalapon	--	0.77 U	0.42 U	0.75 U	0.39 U
2,4,5-T	--	0.045 U	0.044 U	0.42 U	0.22 U
2,4,5-TP (Silvex)	--	0.045 U	0.044 U	2 U	1.1 U
2,4-D	--	0.036 U	0.036 U	2.3 U	0.2 U
2,4-DB (2,4-D derivative)	--	0.043 U	0.042 U	0.4 U	0.21 U
Dicamba	--	0.09 U	0.088 U	0.85 U	0.44 U
Dichloroprop	--	0.17 U	0.17 U	1.6 U	0.83 U
Dinoseb	--	0.1 U	0.047 U	0.45 U	0.24 U
Mecoprop (MCPP)	--	6.7 U	16 U	1000 U	33 U
Mephanac (MCPA)	--	9 U	8.8 U	85 U	44 U

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Location ID	LW3-WR107	LW3-WR107	LW3-WR107	LW3-WR107	LW3-WR107
Sample Date	3/26/2007	4/9/2007	4/18/2007	5/3/2007	5/21/2007
Type	Total	Total	Total	Total	Total
PCB Aroclors (µg/L)					
Aroclor 1016	--	--	--	--	--
Aroclor 1221	--	--	--	--	--
Aroclor 1232	--	--	--	--	--
Aroclor 1242	--	--	--	--	--
Aroclor 1248	--	--	--	--	--
Aroclor 1254	--	--	--	--	--
Aroclor 1260	--	--	--	--	--
Aroclor 1262	--	--	--	--	--
Aroclor 1268	--	--	--	--	--
Total PCB Aroclors (U = 0)	--	--	--	--	--
PCB Congeners (ng/L)					
Total PCB Congener (U = 0)	--	**0.510 J**	**2.619 J**	**4.417 J**	**2.426 J**
Total Petroleum Hydrocarbons (mg/L)					
Gasoline range hydrocarbons	--	--	--	--	--
Diesel range hydrocarbons	--	--	--	--	--
Residual range hydrocarbons	--	--	--	--	--
Diesel/Oil	--	--	--	--	--

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Attachment 2: Gasco Stormwater Analytical Results

Location ID	LW3-WR107	WR107 (SW-1)	WR107 (SW-1)	WR107 (SW-1)	WR107 (SW-1)
Sample Date	5/21/2007	11/9/2009	11/9/2009	11/20/2009	11/20/2009
Type	*Dissolved*	Total	Total-Dup	Total	Total-Dup
Conventional Parameters (mg/L)					
Cyanide	--	**0.034**	**0.033**	**0.003 J**	**0.011**
Cyanide, amenable	--	0.01 U	**0.033**	**0.003 J**	**0.007 J**
Cyanide, available	--	--	--	--	--
Cyanide, free	--	--	--	0.01 U	0.01 U
Cyanide, Weak acid dissociable (WAD)	--	**0.007 J**	**0.004 J**	0.01 U	0.01 U
Total organic carbon	--	**2.47**	**2.52**	**1.18**	**1.14**
Dissolved organic carbon	**4.5**	--	--	--	--
Total suspended solids	--	**7.5**	**8.5**	**19**	**19.5**
Metals (µg/L)					
Aluminum	--	--	--	--	--
Antimony	--	--	--	--	--
Arsenic	--	0.5 U	0.5 U	0.5 U	0.5 U
Cadmium	--	**0.055**	**0.045**	**0.029**	**0.033**
Chromium	--	**0.93**	**0.88**	**0.75**	**0.76**
Copper	--	**4.0**	**4.12**	**3.15**	**2.95**
Lead	--	**3.22**	**3.17**	**1.53**	**1.6**
Mercury	--	0.2 U	0.2 U	0.2 U	0.2 U
Nickel	--	**2.21**	**2.17**	**0.85**	**0.88**
Selenium	--	1 U	1 U	1 U	1 U
Silver	--	--	--	--	--
Vanadium	--	**5.08**	**5.01**	**3.3**	**3.31**
Zinc	--	**48.4 J**	**49.7 J**	**41.4**	**41.7**
Metals, Dissolved (µg/L)					
Aluminum	--	--	--	--	--
Antimony	--	--	--	--	--
Arsenic	--	0.5 U	0.5 U	0.5 U	0.5 U
Cadmium	--	**0.032**	**0.040**	**0.030**	**0.013 J**

Location ID	LW3-WR107	WR107 (SW-1)	WR107 (SW-1)	WR107 (SW-1)	WR107 (SW-1)
Sample Date	5/21/2007	11/9/2009	11/9/2009	11/20/2009	11/20/2009
Type	*Dissolved*	Total	Total-Dup	Total	Total-Dup
Chromium	--	**0.51**	**0.53**	0.48 U	0.51 U
Copper	--	**2.82**	**2.92**	**1.28**	**1.4**
Lead	--	**0.11**	**0.15**	**0.09**	**0.05**
Mercury	--	0.2 U	0.2 U	0.2 U	0.2 U
Nickel	--	**1.94**	**1.86**	**0.56**	**0.42**
Selenium	--	1 U	1 U	1 U	1 U
Silver	--	--	--	--	--
Vanadium	--	**3.17**	**3.26**	**1.57**	**1.62**
Zinc	--	**41.6 J**	**42 J**	**61**	**33.8**
Volatile Organics (µg/L)					
Benzene	--	0.5 U	**0.84**	**22**	**7.1**
Ethylbenzene	--	0.5 U	0.5 U	**0.17 J**	**0.05 J**
m,p-Xylene	--	0.5 U	0.5 U	**0.46 J**	**0.14 J**
o-Xylene	--	0.5 U	0.5 U	**0.21 J**	**0.08 J**
Toluene	--	0.5 U	**0.18 J**	**5.3**	**1.7**
Polycyclic Aromatic Hydrocarbons (µg/L)					
2-Methylnaphthalene	0.025 U	**0.08 J**	0.20 U	0.20 U	0.20 U
Acenaphthene	**1.800**	**0.15 J**	0.20 U	0.20 U	**0.03 J**
Acenaphthylene	**0.071**	**0.35**	**0.09 J**	**0.05 J**	**0.05 J**
Anthracene	**0.140**	**0.34**	**0.15 J**	**0.06 J**	**0.05 J**
Benzo(a)anthracene	0.007 U	**1.10**	**0.14 J**	**0.21**	**0.21**
Benzo(a)pyrene	0.005 U	**1.30**	**0.20 J**	**0.28**	**0.27**
Benzo(b)fluoranthene	**0.003 J**	**2.60**	**0.36**	**0.46**	**0.42**
Benzo(g,h,i)perylene	0.003 U	**2.30**	**0.43**	**0.38**	**0.38**
Benzo(k)fluoranthene	0.003 U	**0.79**	**0.12 J**	**0.15 J**	**0.15 J**
Chrysene	**0.004 J**	**1.60**	**0.23**	**0.27**	**0.26**
Dibenzo(a,h)anthracene	0.003 U	**0.29**	0.20 U	**0.07 J**	**0.06 J**
Fluoranthene	**0.075**	**2.50**	**0.25**	**0.44**	**0.42**

Location ID	LW3-WR107	WR107 (SW-1)	WR107 (SW-1)	WR107 (SW-1)	WR107 (SW-1)
Sample Date	5/21/2007	11/9/2009	11/9/2009	11/20/2009	11/20/2009
Type	*Dissolved*	Total	Total-Dup	Total	Total-Dup
Fluorene	**0.480**	**0.09 J**	0.20 U	0.20 U	0.20 U
Indeno(1,2,3-c,d)pyrene	0.003 U	**1.90**	**0.36**	**0.36**	**0.35**
Naphthalene	0.014 U	**0.29**	**0.05 J**	**0.04 J**	**0.06 J**
Phenanthrene	**0.045**	**0.89**	**0.07 J**	**0.14 J**	**0.11 J**
Pyrene	**0.063**	**3.40**	**0.34**	**0.45**	**0.42**
Total PAH (U = 0)	**2.68 J**	**17.4 J**	**2.43 J**	**2.90 J**	**2.82 J**
Phthalates (µg/L)					
Bis(2-Ethylhexyl)phthalate	--	**0.30 J**	0.96 U	**0.58 J**	**0.60 J**
Butylbenzyl phthalate	--	**0.18 J**	0.20 U	**0.18 J**	**0.20 J**
Diethyl phthalate	--	0.20 U	0.20 U	0.20 U	0.20 U
Dimethyl phthalate	--	**0.36**	**0.24**	**0.06 J**	**0.06 J**
Di-n-butyl phthalate	--	0.20 U	0.20 U	**0.13 J**	**0.13 J**
Di-n-octyl phthalate	--	0.20 U	0.20 U	0.20 U	0.20 U
Miscellaneous Semivolatiles (µg/L)					
Carbazole	--	**0.23**	**0.034 J**	**0.048 J**	**0.051 J**
Dibenzofuran	**0.099**	**0.038 J**	0.2 U	--	--
Herbicides (µg/L)					
Dalapon	0.42 U	--	--	--	--
2,4,5-T	0.24 U	--	--	--	--
2,4,5-TP (Silvex)	1.1 U	--	--	--	--
2,4-D	2.2 U	--	--	--	--
2,4-DB (2,4-D derivative)	0.22 U	--	--	--	--
Dicamba	0.47 U	--	--	--	--
Dichloroprop	0.88 U	--	--	--	--
Dinoseb	0.25 U	--	--	--	--
Mecoprop (MCPP)	550 U	--	--	--	--
Mephanac (MCPA)	47 U	--	--	--	--

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Location ID	LW3-WR107	WR107 (SW-1)	WR107 (SW-1)	WR107 (SW-1)	WR107 (SW-1)
Sample Date	5/21/2007	11/9/2009	11/9/2009	11/20/2009	11/20/2009
Type	*Dissolved*	Total	Total-Dup	Total	Total-Dup
PCB Aroclors (µg/L)					
Aroclor 1016	--	0.2 U	0.21 U	0.2 U	0.2 U
Aroclor 1221	--	0.4 U	0.42 U	0.39 U	0.4 U
Aroclor 1232	--	0.2 U	0.21 U	0.2 U	0.2 U
Aroclor 1242	--	0.2 U	0.21 U	0.2 U	0.2 U
Aroclor 1248	--	0.2 U	0.21 U	0.2 U	0.2 U
Aroclor 1254	--	0.2 U	0.21 U	0.2 U	0.2 U
Aroclor 1260	--	0.2 U	0.21 U	0.2 U	0.2 U
Aroclor 1262	--	0.2 U	0.21 U	--	--
Aroclor 1268	--	0.2 U	0.21 U	--	--
Total PCB Aroclors (U = 0)	--	0.4 U	0.42 U	0.39 U	0.4 U
PCB Congeners (ng/L)					
Total PCB Congener (U = 0)	0.056 U	--	--	--	--
Total Petroleum Hydrocarbons (mg/L)					
Gasoline range hydrocarbons	--	**0.013 J**	**0.017 J**	0.25 U	**0.02 J**
Diesel range hydrocarbons	--	**0.11 J**	**0.12 J**	0.11 U	0.15 U
Residual range hydrocarbons	--	0.5 U	0.53 U	0.41 U	0.41 U
Diesel/Oil	--	--	--	--	--

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Location ID	WR107 (SW-1)	WR107 (SW-1)	WR107 (SW-1)	WR107 (SW-1)
Sample Date	2/10/2010	2/10/2010	4/2/2010	4/2/2010
Type	Total	Total-Dup	Total	Total-Dup
Conventional Parameters (mg/L)				
Cyanide	**0.047**	**0.051**	**0.004 J**	0.01 U
Cyanide, amenable	--	--	--	--
Cyanide, available	0.002 U	0.002 U	**0.00051 J**	**0.00048 J**
Cyanide, free	0.01 UJ	0.01 UJ	0.01 U	0.01 U
Cyanide, Weak acid dissociable (WAD)	0.01 U	**0.004 J**	0.01 U	**0.003 J**
Total organic carbon	**1.8**	**2.08**	**1.36**	**1.27**
Dissolved organic carbon	--	--	--	--
Total suspended solids	**5.5**	**14**	**9.5**	**9**
Metals (µg/L)				
Aluminum	--	--	--	--
Antimony	--	--	--	--
Arsenic	**0.4 J**	**5**	**0.37 J**	**0.33 J**
Cadmium	**0.051**	**0.056**	0.035 U	0.042 U
Chromium	**1.04**	**0.81**	**0.9**	**1.01**
Copper	**4.33**	**1.99**	**2.36**	**2.41**
Lead	**1.15**	**1.31**	**2.95**	**5.21**
Mercury	0.2 U	0.2 U	0.2 U	0.2 U
Nickel	**1.72**	**1.59**	**1.12**	**1.94**
Selenium	1 U	1 U	2 U	2 U
Silver	--	--	--	--
Vanadium	**5.01**	**4.21**	**4.02**	**5.38**
Zinc	**107**	**41.3**	**37**	**27.1**
Metals, Dissolved (µg/L)				
Aluminum	--	--	--	--
Antimony	--	--	--	--
Arsenic	**0.3 J**	**0.4 J**	**0.22 J**	**0.2 J**
Cadmium	**0.044**	**0.061**	0.028 U	0.027 U

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Location ID	WR107 (SW-1)	WR107 (SW-1)	WR107 (SW-1)	WR107 (SW-1)
Sample Date	2/10/2010	2/10/2010	4/2/2010	4/2/2010
Type	Total	Total-Dup	Total	Total-Dup
Chromium	**0.84**	**0.84**	0.62 U	0.58 U
Copper	**2.95**	**3.59**	**1.32**	**1.29**
Lead	**0.27**	**0.27**	**0.34**	**0.30**
Mercury	0.2 U	0.2 U	0.2 U	0.2 U
Nickel	**1.89**	**2.88**	**0.85**	**0.76**
Selenium	1 U	1 U	2 U	2 U
Silver	--	--	--	--
Vanadium	**3.9**	**3.75**	**2.04**	**1.89**
Zinc	**85.3**	**79.4**	**25.7**	**32.2**
Volatile Organics (µg/L)				
Benzene	**350**	**340**	**36**	**51**
Ethylbenzene	**4.3**	**4.6**	**0.51**	**0.58**
m,p-Xylene	**13**	**13**	**1.1**	**1.2**
o-Xylene	**7.2**	**7.1**	**0.51**	**0.57**
Toluene	**88**	**84**	**8.7**	**12**
Polycyclic Aromatic Hydrocarbons (µg/L)				
2-Methylnaphthalene	0.20 U	**17.00**	**0.06 J**	0.20 U
Acenaphthene	**0.03 J**	**20.00**	**0.19 J**	0.20 U
Acenaphthylene	**0.14 J**	**1.10**	**0.07 J**	**0.11 J**
Anthracene	**0.45**	**1.90**	**0.08 J**	**0.10 J**
Benzo(a)anthracene	**0.12 J**	**0.79**	**0.15 J**	**0.17 J**
Benzo(a)pyrene	**0.17 J**	**0.87**	**0.23**	**0.33**
Benzo(b)fluoranthene	**0.23**	**0.94**	**0.42**	**0.58**
Benzo(g,h,i)perylene	**0.31**	**0.70**	**0.49**	**0.83**
Benzo(k)fluoranthene	**0.09 J**	**0.30**	**0.11 J**	**0.17 J**
Chrysene	**0.11 J**	**1.10**	**0.18 J**	**0.24**
Dibenzo(a,h)anthracene	**0.04 J**	**0.09 J**	**0.16 J**	**0.18 J**
Fluoranthene	**0.17 J**	**3.90**	**0.36**	**0.31**

Location ID	WR107 (SW-1)	WR107 (SW-1)	WR107 (SW-1)	WR107 (SW-1)
Sample Date	2/10/2010	2/10/2010	4/2/2010	4/2/2010
Type	Total	Total-Dup	Total	Total-Dup
Fluorene	0.20 U	**6.60**	**0.07 J**	0.20 U
Indeno(1,2,3-c,d)pyrene	**0.27**	**0.68**	**0.42**	**0.68**
Naphthalene	**0.05 J**	**59.00**	**0.21**	**0.10 J**
Phenanthrene	**0.08 J**	**7.50**	**0.15 J**	**0.11 J**
Pyrene	**0.22**	**4.30**	**0.40**	**0.41**
Total PAH (U = 0)	**2.24 J**	**126 J**	**3.33 J**	**3.74 J**
Phthalates (µg/L)				
Bis(2-Ethylhexyl)phthalate	0.98 U	**0.17 J**	4.90 U	1.20 U
Butylbenzyl phthalate	0.20 U	0.20 U	**0.36**	0.20 U
Diethyl phthalate	0.20 U	0.20 U	**0.05 J**	0.20 U
Dimethyl phthalate	0.20 U	0.20 U	**0.24**	**0.23**
Di-n-butyl phthalate	0.20 U	0.20 U	**0.09 J**	**0.07 J**
Di-n-octyl phthalate	0.20 U	0.20 U	0.20 U	0.20 U
Miscellaneous Semivolatiles (µg/L)				
Carbazole	**0.04 J**	**5.2**	**0.087 J**	**0.052 J**
Dibenzofuran	0.2 U	**1.1**	**0.023 J**	0.2 U
Herbicides (µg/L)				
Dalapon	--	--	--	--
2,4,5-T	--	--	--	--
2,4,5-TP (Silvex)	--	--	--	--
2,4-D	--	--	--	--
2,4-DB (2,4-D derivative)	--	--	--	--
Dicamba	--	--	--	--
Dichloroprop	--	--	--	--
Dinoseb	--	--	--	--
Mecoprop (MCPP)	--	--	--	--
Mephanac (MCPA)	--	--	--	--

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Location ID	WR107 (SW-1)	WR107 (SW-1)	WR107 (SW-1)	WR107 (SW-1)
Sample Date	2/10/2010	2/10/2010	4/2/2010	4/2/2010
Type	Total	Total-Dup	Total	Total-Dup
PCB Aroclors (µg/L)				
Aroclor 1016	0.2 U	0.2 U	0.2 U	0.2 U
Aroclor 1221	0.39 U	0.4 U	0.4 U	0.4 U
Aroclor 1232	0.2 U	0.2 U	0.2 U	0.2 U
Aroclor 1242	0.2 U	0.2 U	0.2 U	0.2 U
Aroclor 1248	0.2 U	0.2 U	0.2 U	0.2 U
Aroclor 1254	0.2 U	0.2 U	0.2 U	0.2 U
Aroclor 1260	0.2 U	0.2 U	0.2 U	0.2 U
Aroclor 1262	0.2 U	0.2 U	0.2 U	0.2 U
Aroclor 1268	0.2 U	0.2 U	0.2 U	0.2 U
Total PCB Aroclors (U = 0)	0.39 U	0.4 U	0.4 U	0.4 U
PCB Congeners (ng/L)				
Total PCB Congener (U = 0)	--	--	--	--
Total Petroleum Hydrocarbons (mg/L)				
Gasoline range hydrocarbons	**0.4 J**	**0.38 J**	0.25 U	**0.045 J**
Diesel range hydrocarbons	--	--	0.1 U	0.11 U
Residual range hydrocarbons	0.11 U	0.11 U	**0.037 J**	**0.049 J**
Diesel/Oil	**0.05 J**	**0.72 J**	--	--

Notes:

Bold: Detected result

--: Not analyzed

J: Estimated value

U: Compound analyzed but not detected above detection limit

UJ: Compound analyzed but not detected above estimated detection limit

Data sources: Anchor QEA and HAI 2010; LWG 2016

Anchor QEA and HAI (Anchor QEA, LLC, and Hahn and Associates, Inc.), 2010. *Final Stormwater Source Control Data Summary Report, NW Natural Gasco Site* . Prepared for NW Natural. September 2010.

LWG (Lower Willamette Group), 2016. *Final Remedial Investigation Report, Appendix C: Stormwater Statistics and Groundwater Characterization* . Portland Harbor RI/FS. February 2016.

Abbreviations:

µg/L: micrograms per liter

AWQC: Ambient Water Quality Criteria

Dup: duplicate sample

mg/L: milligrams per liter

PAH: polycyclic aromatic hydrocarbon

PCB: polychlorinated biphenyl

EXHIBIT 5

Memorandum

To: *Sean Sheldrake, U.S. EPA Region 10*

From: *Lance Peterson, RG*
Paula Kulis, Ph.D., PE

Date: *December 19, 2013*

Subject: *Application of Portland Harbor Recontamination Evaluation Framework to Proposed Treated Wastewater Outfall, Gasco Early Action Site*

On January 28, 2011, the Oregon Department of Environmental Quality (DEQ) received a National Pollutant Discharge Elimination System (NPDES) permit application from NW Natural. Supplemental information was received by DEQ on May 10, 2011, January 31, 2012 and October 31, 2012. The application was for a new NPDES permit to discharge treated groundwater and stormwater (collectively called wastewater in this evaluation) from the Gasco site to the Willamette River. Specifically the discharge will consist of treated groundwater from the upland hydraulic control and containment system and treated stormwater/groundwater removed from the site liquefied natural gas (LNG) basin. DEQ solicited public comments on the permit in April/May 2013. We understand the permit is pending the results of a National Marine Fisheries Service consultation regarding the treated wastewater outfall. While the wastewater treatment process is designed to reduce contaminant dissolved concentrations below proposed NPDES permit requirements in order to meet in-stream water quality standards, the impact of the discharge on sediments has not been evaluated. The U.S. Environmental Protection Agency (EPA) Region 10 requested that CDM Smith evaluate the potential for recontamination of clean, post-remediation sediment in the river resulting from the discharge of residual concentrations of pollutants in the treated wastewater outfall stream. The results of this evaluation are provided below.

Recontamination Evaluation Framework

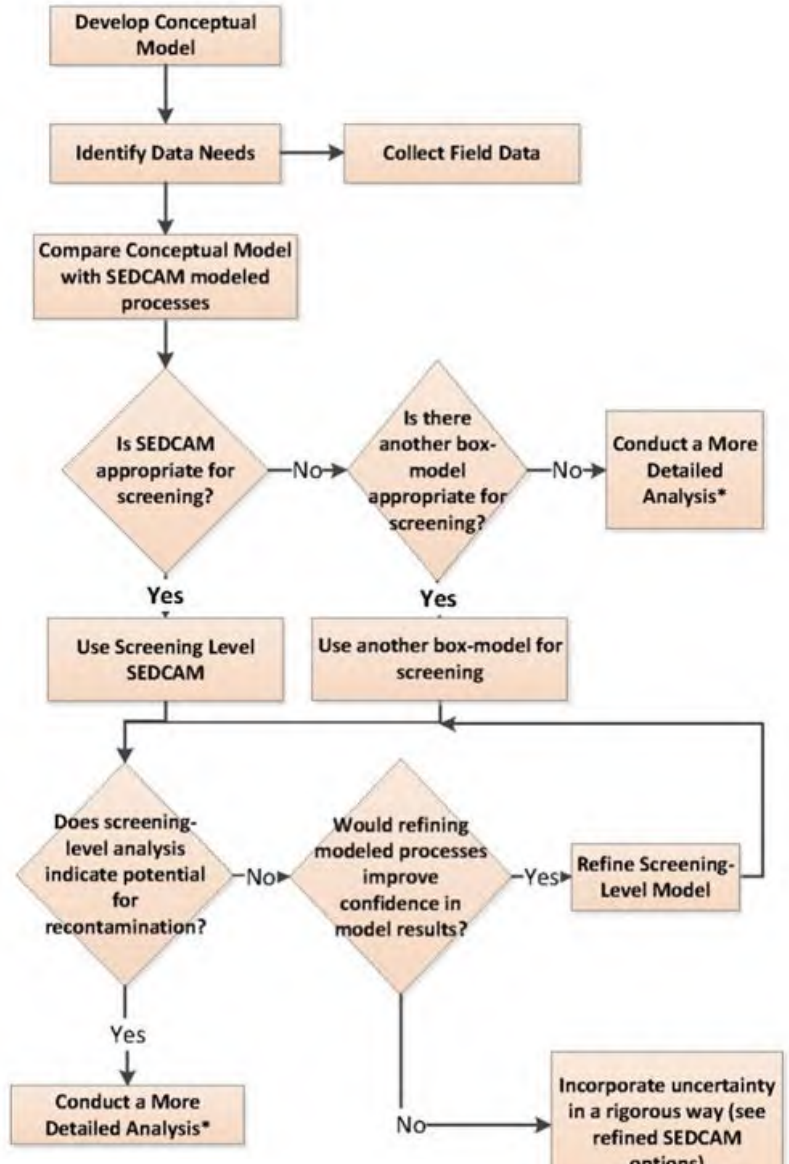
In January 2013, CDM Smith developed a draft Site Level Recontamination Evaluation Framework (Framework) on behalf of EPA Region 10 for the Portland Harbor Superfund Site (CDM Smith 2013). CDM Smith used this Framework as a guide to complete the recontamination evaluation of the Gasco treated wastewater outfall.

The basic elements of the Framework are depicted in **Figure 1**. The first steps of the Framework consist of the development of a conceptual model including assessment of contamination pathways and the identification of data needs. Following development of the conceptual model,

the Framework then recommends applying a simple screening-level tool such as the SEDCAM model (Jacobs et al. 1988), if appropriate, to assess "worst case scenario" conditions and order-of magnitude relationships. Results from this initial screening level tool can be used to inform additional, more detailed analyses as necessary.

The Gasco treated wastewater outfall analysis is limited to the initial screening steps in the Framework. Additional analysis is not considered part of the present evaluation.

Figure 1 – Recontamination Evaluation Key Elements



*More detailed analysis will likely require additional data collection.

Exhibit 5-002

In developing a conceptual model of the Gasco treated wastewater outfall into the Willamette River, pathways of contaminants into the river sediment were identified and quantified to the extent possible. Data gaps were identified that for the purposes of this study were incorporated using conservative assumptions and a sensitivity analysis on model input parameters. As noted above, collection of additional field data was beyond the scope of this study.

The proposed outfall (Outfall 001) in the Willamette River consists of a 6-inch diameter high-density polyethylene pipe extending below an existing dock at the Gasco site. The pipe will be at least 12 feet below the water surface during low water levels, and will terminate with a 12-foot long horizontal diffuser extending perpendicular to the Willamette River's flow direction. Treated water will exit the diffuser which consists of four 2-inch ports located on 2-foot risers having a spacing of 4 feet between ports. These ports will be oriented downstream. Figures depicting the plan and profile of the outfall are included in **Attachment 1**. A conceptual plan view depiction of the outfall is shown in **Figure 2**.

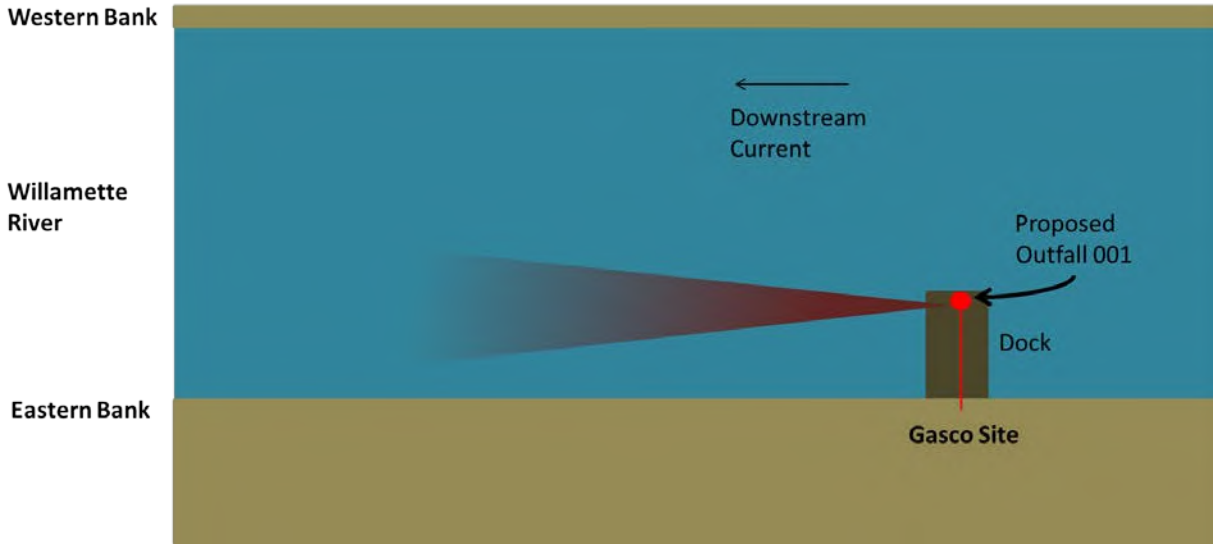


Figure 2. Treated Wastewater Outfall 001 Configuration

No suspended solids load is anticipated from the treated water discharge since bag filters are included in the treatment system design. However, dissolved residual contaminants in the treated wastewater flow may adsorb onto sediment particles suspended in the Willamette River. When these suspended particles subsequently sink, river bed contamination could result as this process continues over time. The top layer of sediment in the river bed generally experiences significant mixing, and from this layer particles with adsorbed contaminants may be buried into deeper sediment. The settling, mixing and burial process is depicted in cross section in **Figure 3**. *This contamination pathway is the only pathway explored in the Gasco treated wastewater outfall study.* Potential pathways not included in this study include contaminant loading originating

from upstream and stormwater runoff with the exception of the treated stormwater that discharges through Outfall 001 at the Gasco site.

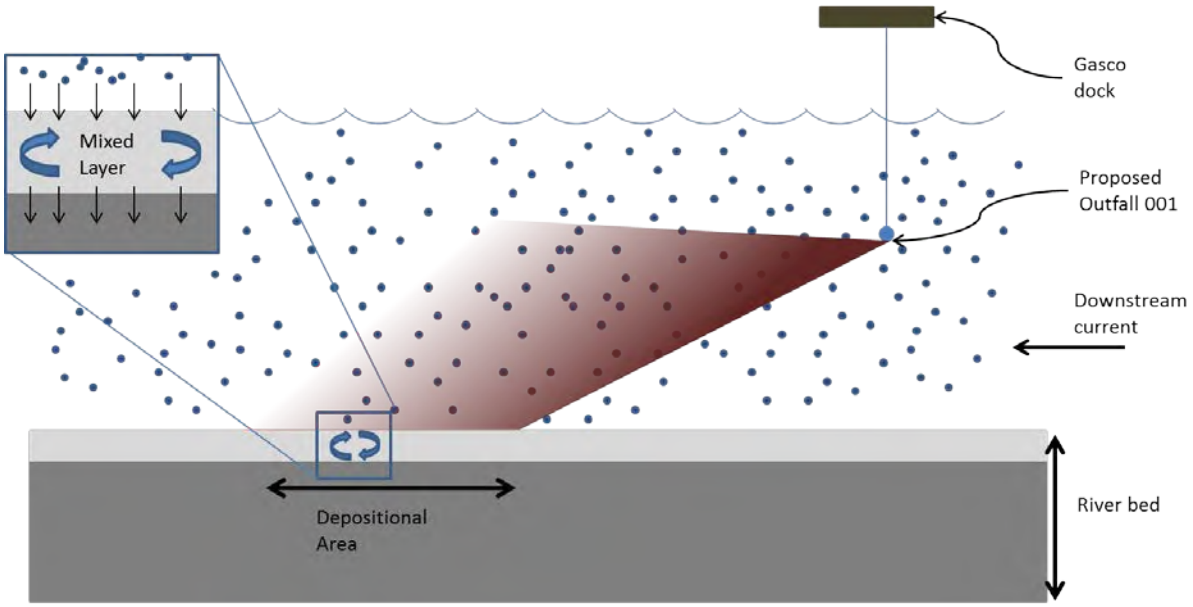


Figure 3: Conceptual Model of Contamination Pathway at Outfall 001

Methodology

Evaluation of SEDCAM's Applicability

Following the framework, SEDCAM was evaluated as a potential screening-level tool. SEDCAM is a 1-D mass balance box model that evaluates contamination of the sediment mixed layer over time. The model incorporates steady-state sedimentation and contaminant loading rates, and includes a decay rate for non-conservative constituents (though this term can also be used to account for in-sediment diffusion).

SEDCAM applications to the Portland Harbor site have historically been analyses of contaminated total suspended solids (TSS) loadings from an unfiltered point source that settle over a fixed depositional area. At the Gasco site, the contamination pathway involves adsorption to suspended sediment from upstream. This sediment has a much lower settling velocity than larger sediment particles from an unfiltered stormwater outfall (on the order of 10^{-5} m/s). Because of this low settling velocity, it is not appropriate to calculate a discrete depositional area. However, it is appropriate to estimate a "worst case" sediment concentration of adsorbed pollutant from Outfall 001. Using this estimate of adsorbed sediment concentrations in the water column, the principles of SEDCAM still represent the potential contamination pathway at Gasco Outfall 001 discussed above. For this reason, it was determined that the SEDCAM equations could be used as an initial screening tool to evaluate the Gasco treated wastewater discharge.

SEDCAM Application

The mass balance components of SEDCAM require information on sedimentation rates and contamination concentrations in incoming sediment. Information regarding the sediment characteristics, such as sediment density and the thickness of the surface mixed layer in the river bed, are also necessary. This information was determined based on previous studies at the Gasco and other Portland Harbor sites. Where documented values spanned several orders of magnitude (or varied sufficiently to potentially alter model results significantly), a range was used to define different model scenarios. **Table 1** summarizes the parameter values used in SEDCAM, and the source(s) of information used to determine these values. Additional details relating to some parameters are discussed below.

Table 1: SEDCAM Model Parameters

Model Parameter	Value	Source
Pollutant Concentrations in Suspended River Sediment	Listed in Table 2	Draft NPDES Permit (DEQ 2013)
Particle Density	1.1 g/cm^3	Estimate based on several Portland Harbor studies (Anchor QEA 2012b), (Newfields 2009), (Integral 2008)
Total Suspended Solids in River	2-60 mg/L	Draft Remedial Investigation Report (Lower Willamette Group 2009)
Sedimentation Rate	1-5 cm/year	Measured and observed values (Anchor QEA 2012a)
Mixed Layer Thickness	15 cm	(Newfields 2009)
Adsorption Rate	75-100%	Conservative estimate based on wide range of chemicals being analyzed and uncertainties regarding sediment adsorption properties
Decay Rate	0	(Integral 2008), (Newfields 2009)

Notes:
cm – centimeter
g/cm^3 – grams per cubic centimeter
mg/L – milligrams per liter

Adsorbed Contaminant Concentrations

Suspended sediment contaminant concentrations were determined based on the minimum dilution factor calculated at the edge of the Regulatory Mixing Zone (RMZ), as generated in the dilution study which is an addendum to the NPDES permit application (Sevenson 2012). A sensitivity analysis of the discharge plume showed a minimum of a 40-fold dilution beyond end of pipe concentrations. Upper limits for end of pipe concentrations are presented in Schedule A of the Draft NPDES Permit (DEQ 2013). End of pipe concentrations and concentrations at the RMZ

edge are summarized in **Table 2** below[1]. Cyanide was not included in the Gasco treated wastewater outfall study because of its low adsorption rate. A recontamination evaluation for pH was also not conducted as part of the study.

Table 2: Loadings

Water Quality Constituent	Permitted Monthly Average Concentration (µg/L)	Concentrations at RMZ Edge (µg/L)
Benzo(a)anthracene	0.0038	9.50E-05
Benzo(a)pyrene	0.0038	9.50E-05
Copper	15	3.75E-01
Dibenzo(a,h)anthracene	0.0038	9.50E-05
Indeno(1,2,3-cd)pyrene	0.0038	9.50E-05
Iron	820	2.05E+01
Lead	3.8	9.50E-02
Mercury	0.01	2.50E-04

Source: Draft NPDES Permit (DEQ 2013)
Notes:
µg/L – microgram per liter

Scenarios
Three scenarios were developed from the parameters in **Table 1.** The parameters that appeared to have a wide range of values that influenced model results include sedimentation rate, TSS, and adsorption of contaminants to sediment particles. The parameter values used in each scenario are summarized in **Table 3**, and are explained below in more detail. The scenarios were designed to represent more conservative (Scenario 1), medium (Scenario 2) and less conservative (Scenario 3) conditions.

Table 3: SEDCAM Model Scenarios

Model Parameter	Range	Scenario 1	Scenario 2	Scenario 3
Sedimentation Rate (cm/yr)	1-5	1	2.5	5
Total Suspended Solids (mg/L)	2-60	2	30	60
Adsorption rate (%)	75-100	100	90	75

Sedimentation Rate
Both modeled and measured sedimentation rates were provided in the Gasco Draft Engineering Evaluation/Cost Estimate (EE/CA) (Anchor QEA 2012a) as noted on EE/CA Figure 2-14. Several factors contribute to uncertainty associated with these values:

[1] Though limits for cyanide are included in the permit, they are excluded from this recontamination study. Because of cyanide's low adsorption rate, significant cyanide sediment concentrations are not anticipated.

- Sedimentation rates were estimated qualitatively by CDM Smith from figures in the EE/CA (numerical data was not requested from the authors).
- Sedimentation rates were not available for certain capping and dredging areas discussed in the EE/CA.
- A wide range of sedimentation rates were reported in the EE/CA over the estimated areas of deposition associated with the treated wastewater outfall.

Because of these uncertainties, the range defined in **Tables 1** and **3** was developed.

Total Suspended Solids
TSS measured near the Gasco site at River Mile 6 (Lower Willamette Group 2009) range between 2 and 60 mg/L. The values used in Scenarios 1 through 3 are intended to bracket these observed values.

Adsorption Rates
Adsorption rates of dissolved constituents to sediment particles are also a source of significant uncertainty in the Gasco treated wastewater outfall study. What data that is available to inform adsorption rates suggests that near 100% adsorption is possible. As a result, the Gasco treated wastewater outfall study uses the conservative estimate that 75-100% of the contaminant load exiting the outfall is instantly adsorped onto suspended sediment.

Assumptions and Limitations

The Gasco treated wastewater outfall study is limited to the first step of the Framework where a screening-level tool is applied. Consequently, only data available from existing sources was used for this analysis. Other limitations and assumptions include:

- Only pollutant pathways specific to the treated wastewater outfall are considered in this study. Contamination originating from upstream or other sources (e.g., stormwater) is not considered.
- The Gasco treated wastewater outfall study assumes that river sediments are initially clean, with zero contaminant concentrations.
- Some data limitations require conservative estimates, including:
    - Most (75-100%) of the contamination exiting the outfall pipe will adsorb to sediment particles.
    - The concentration at the edge of the RMZ defined in the dilution study, along with the in-river TSS concentration, is used to calculate a concentration adsorbed to the suspended sediments. This treatment of concentrations implies an assumption that no additional mixing occurs between the edge of the RMZ and particle deposition.

- Deposition rates vary temporally and spatially. In addition, river flow varies seasonally and in response to tidal elevation. As a result, an assumption of a single deposition rate is an oversimplification.

Results

Table 4 summarizes the SEDCAM simulated river bed concentrations for each water quality constituent listed in **Table 2** under all sensitivity scenarios after 30 years of constant sediment and contaminant loading as described in the above sections. The table compares model results with Portland Harbor site-specific Preliminary Remediation Goals (PRGs).

As can be seen from the table, SEDCAM results are highly sensitive to the parameters varied in Scenarios 1, 2 and 3. However, almost all constituents are below their respective PRGs. Results for copper in Scenario 1 (most conservative scenario) are slightly above the PRG. However, pilot plant measurements indicate that actual copper concentrations in discharged water will be below 10 µg/L (Sevenson 2012), while 15 µg/L is used for the present recontamination evaluation. If SEDCAM is run with an end of pipe concentration of 10 µg/L, steady state sediment copper concentrations are 125 mg/kg, below the PRG of 150 mg/kg. All polycyclic aromatic hydrocarbon (PAH) compounds are also close to the 0.05 mg/kg PRG limit in Scenario 1, though they do not exceed it.

Table 4: SEDCAM Results for Water Quality Constituents after 30 Years

Constituent	PRG (mg/kg)	30-Year Sediment Concentration (mg/kg)		
		Scenario 1	Scenario 2	Scenario 3
Benzo(a)anthracene	0.05	4.22E-02	2.84E-03	1.19E-03
Benzo(a)pyrene	0.05	4.22E-02	2.84E-03	1.19E-03
Copper	150	**1.67E+02**	1.12E+01	4.69E+00
Dibenzo(a,h)anthracene	0.05	4.22E-02	2.84E-03	1.19E-03
Indeno(1,2,3-cd)pyrene	0.05	4.22E-02	2.84E-03	1.19E-03
Iron	NA	9.11E+03	6.12E+02	2.56E+02
Lead	91	4.22E+01	2.84E+00	1.19E+00
Mercury	NA	1.11E-01	7.47E-03	3.12E-03

Notes:
Bold indicates predicted concentration is above the PRG value
mg/kg – milligrams per kilogram
NA - Not available
TBD - To be determined

SEDCAM's parameters simulate a simplified river bed with constant inputs over time. SEDCAM results therefore tend to show convergence over time to a steady state river bed contaminant concentration. The Gasco treated wastewater outfall study discusses model results after 30 years

of simulation time, after which the steady state concentration is only reached for Scenario 3 (which has the highest sedimentation rate). In Scenario 1, where sedimentation rates are low, river bed concentrations have reached 89% of the final steady-state concentration after 30 years. For Scenarios 2 and 3, the river bed has reached its final steady state concentration 30 years into the simulation. **Figure 4** shows SEDCAM results for Benzo(a)pyrene. It is clear from the figure that the sediment concentration in Scenario 1 is still increasing slightly over time after 30 years of simulated outfall operation. Similar figures showing SEDCAM results for each contaminant are presented in **Attachment 2**. These figures also demonstrate the variation of model results among Scenarios 1, 2, and 3.

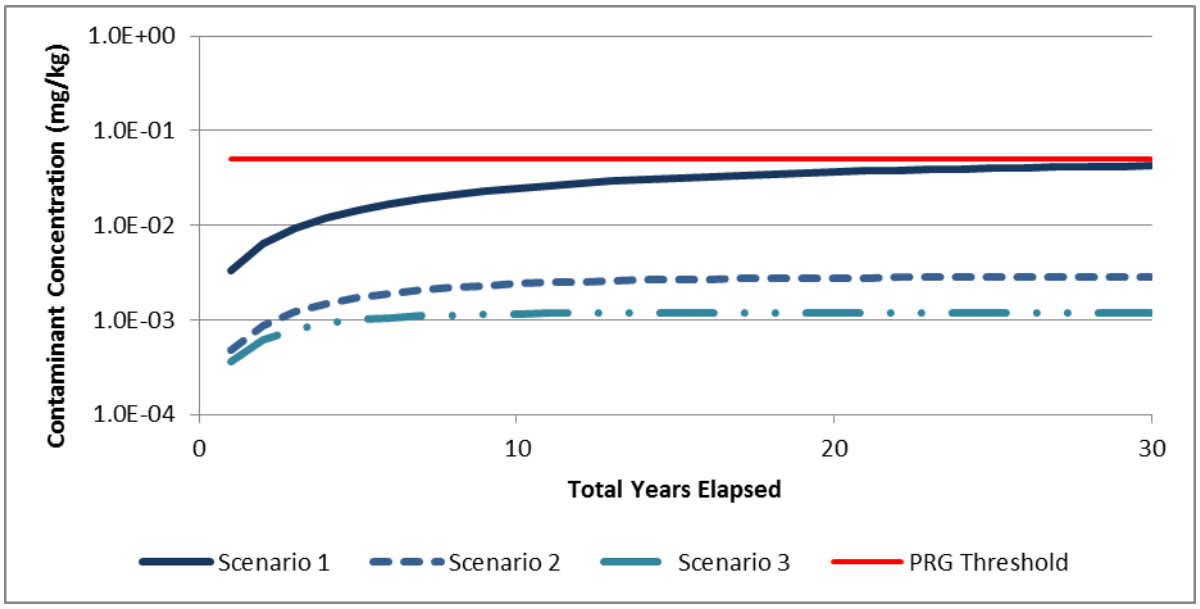


Figure 4: SEDCAM Results for Benzo(a)pyrene

Recommendations

SEDCAM is a very approximate model, and several conservative assumptions relative to in-river mixing and settling, chemical adsorption, and sedimentation rates were made in applying it to the recontamination evaluation of the Gasco treated wastewater outfall. Because of these assumptions, model scenarios were selected to bracket expected conditions in the Willamette River.

Most model scenarios showed sediment concentrations below desired concentration limits. Scenario 1 resulted in PAH concentrations close to the PRG. Copper simulations are slightly above the PRG in Scenario 1; however, conservative estimates of end of pipe concentrations may warrant lowering the copper and PAH concentration for all scenarios, as discussed above.

Because the scenarios investigated included conservative river and contaminant characteristics, this study indicates that future recontamination of sediment due to the Gasco treated wastewater outfall alone is unlikely.

References

Anchor QEA. 2012a. Draft Engineering Evaluation/Cost Estimate, Gasco Sediments Cleanup Site. Prepared for U.S. Environmental Protection Agency Region 10 on behalf of NW Natural. May 2012.

Anchor QEA. 2012b. Portland Harbor RI/FS Draft Feasibility Study. Prepared for the Lower Willamette Group. March 30, 2012.

CDM Smith, 2013. Draft Technical Memorandum, Site Level Recontamination Evaluation Framework, Portland Harbor Superfund Site. January 4, 2013.

Integral Consulting Inc. 2008. Draft Stormwater Interim Remedial Measures, Focused Feasibility Study Report, Arkema Portland Facility. Prepared for Legacy Site Services LLC. July 3, 2008.

Jacobs, L., R. Barrick, and T. Ginn. 1988. Application of a Mathematical Model (SEDCAM) to Evaluate the Effects of Source Control on Sediment Contamination in Commencement Bay. pp. 677 to 684. [In:] Proceedings; First Annual Meeting on Puget Sound Research; Volume 2. 18 to 19 March 1988; The Seattle Center; Seattle, Washington. Puget Sound Water Quality Authority; Seattle, Washington.

Lower Willamette Group. 2009. Portland Harbor Superfund Site Draft Remedial Investigation Report. October, 2009.

Newfields. 2009. Sediment Recontamination Analysis Approach. Terminal 4 Removal Action. Port of Portland, Portland, Oregon.

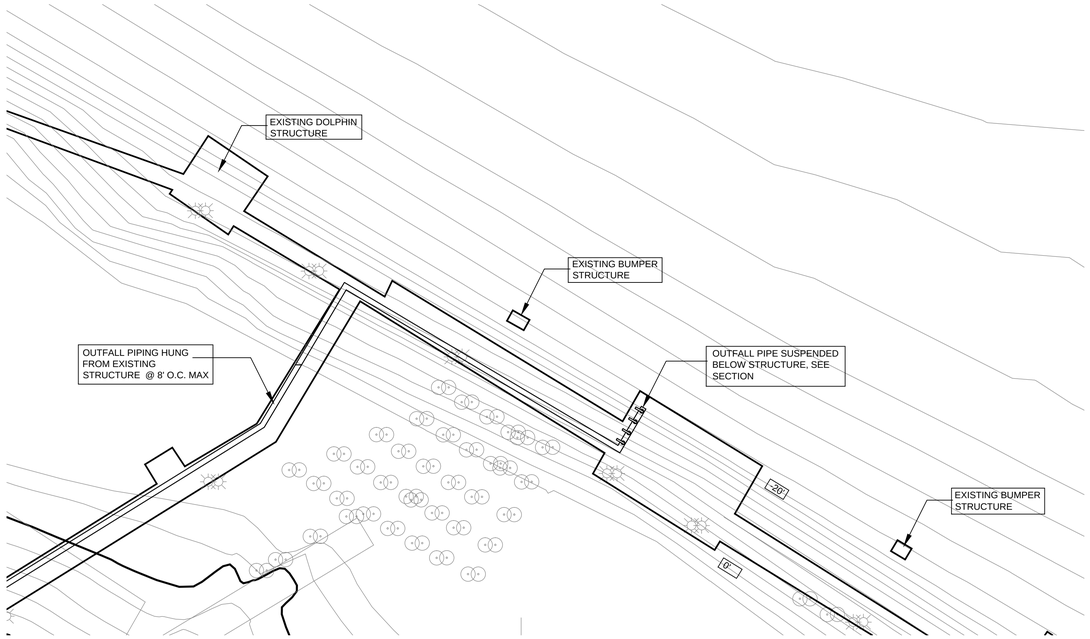
Oregon Department of Environmental Quality. 2013. Request for Comments, Proposed Issuance of NPDES Permit for NW Natural's "Gasco Site" Groundwater Source Control Measure. Issued April 18, 2013.

Sevenson Environmental Services, Inc. 2012. NW Natural and Siltronic Source Control Treatment Plant Mixing Zone/Dilution Study. Revised October 2012. Prepared for NW Natural Gas Company.

Attachment 1

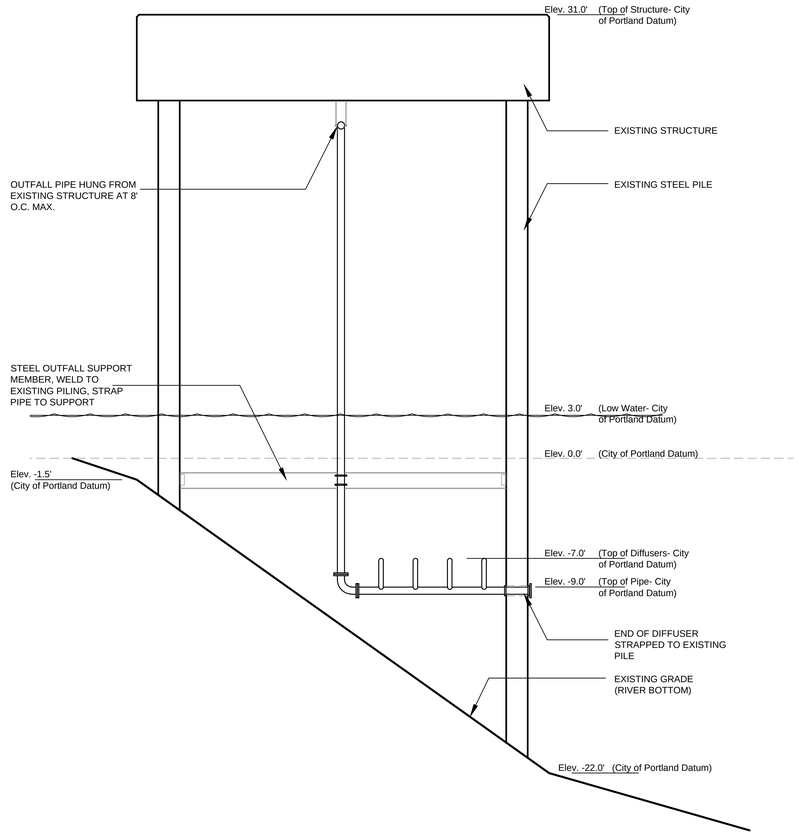
Gasco Outfall Location and Profile

Figure 2 from Draft NPDES Permit (DEQ, 2013). Proposed outfall location.



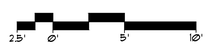
DETAIL PLAN @ OUTFALL

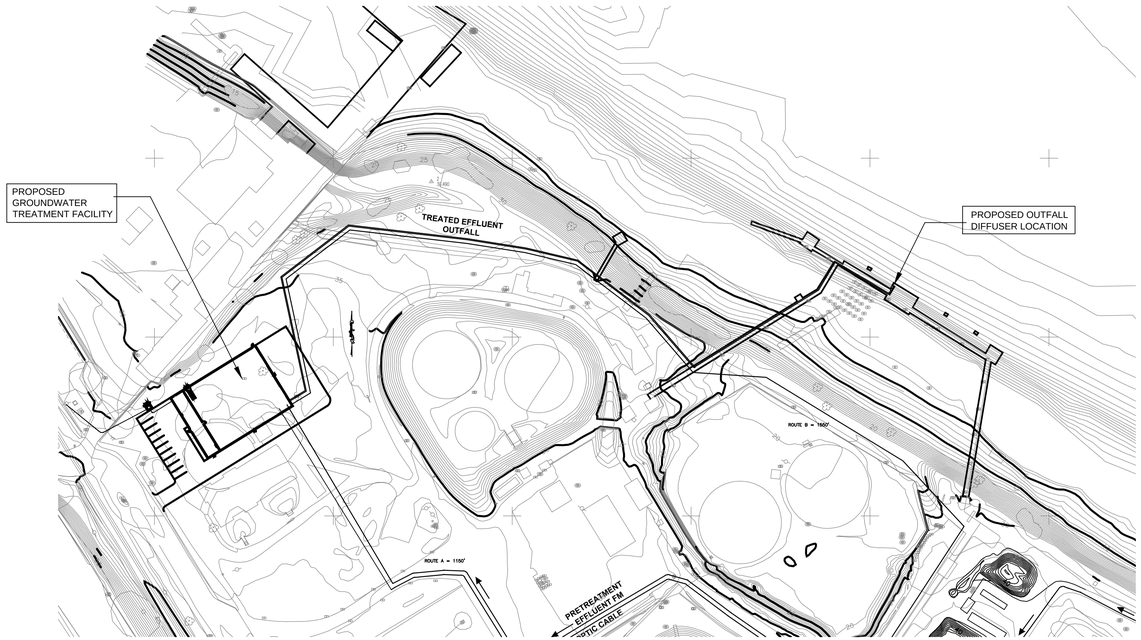
SCALE: 1"= 20'



SECTION @ OUTFALL

SCALE: 1"= 5'





SITE PLAN- OUTFALL PIPING

SCALE: 1"= 100'

1" ON ORIGINAL DRAWING

SITE OUTFALL PIPE

NW NATURAL GASCO
GROUNDWATER SOURCE CONTROL
WASTEWATER TREATMENT PLANT
PORTLAND, OREGON

SEVENSON ENVIRONMENTAL SERVICES, INC.

ADA
APONOWICH, DRISCOLL & ASSOCIATES, INC.

TS JONES CONSULTING

DRAWING OF – 1

DATE:	10.11.12
DRAWN BY:	
CHECKED BY:	MDC
CAD FILE:	
SCALE:	AS NOTED

Exhibit 5-013

Attachment 2

Gasco SEDCAM Results

This attachment contains figures of SEDCAM model results for all chemical constituents assessed in the Gasco treated wastewater outfall recontamination evaluation.

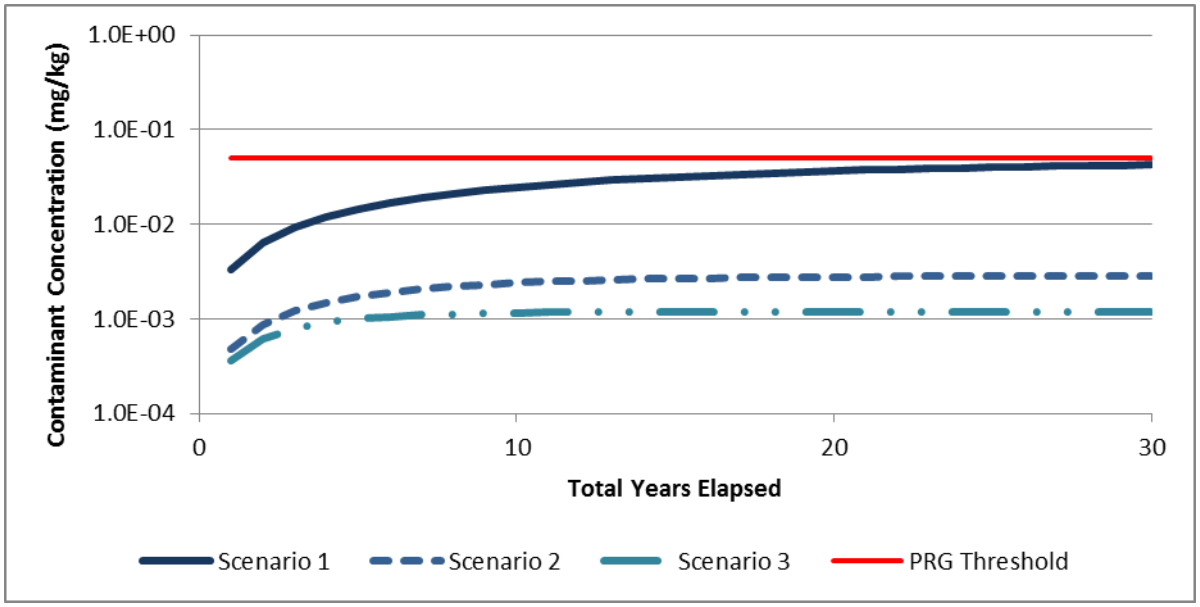


Figure 2.1: Benzo(a)anthracene.

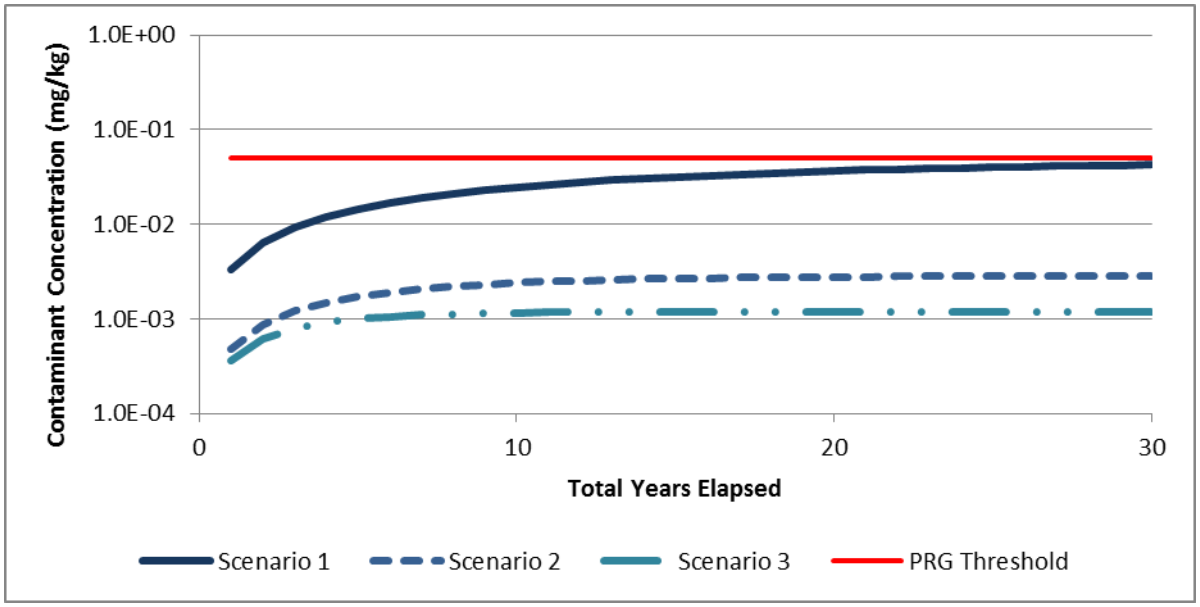


Figure 2.2: Benzo(a)pyrene.

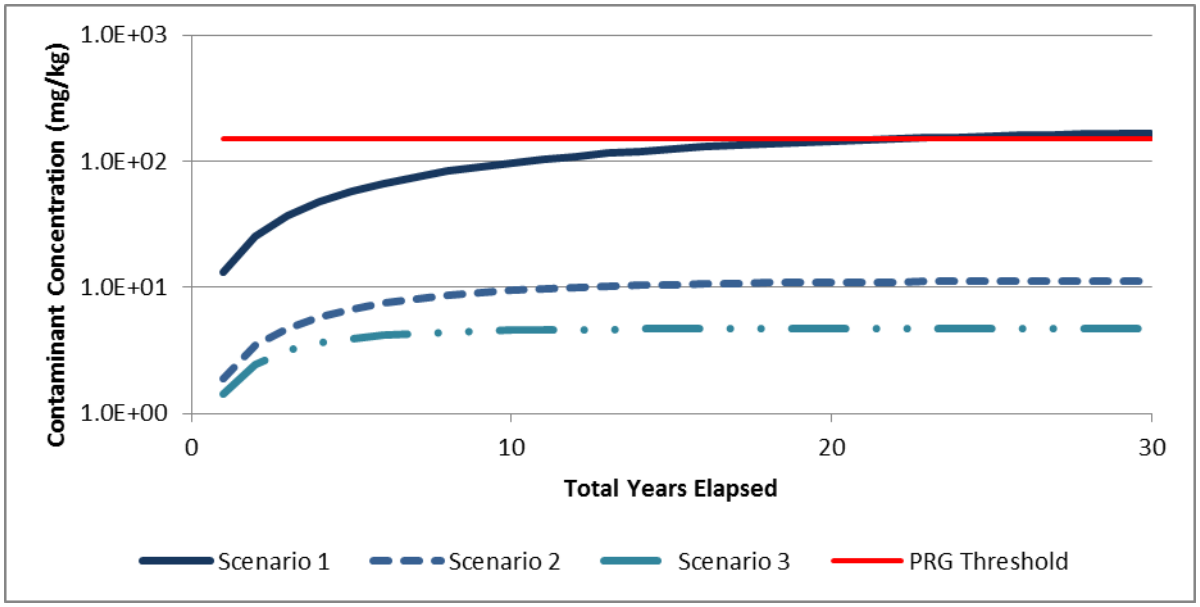


Figure 2.3: Copper.

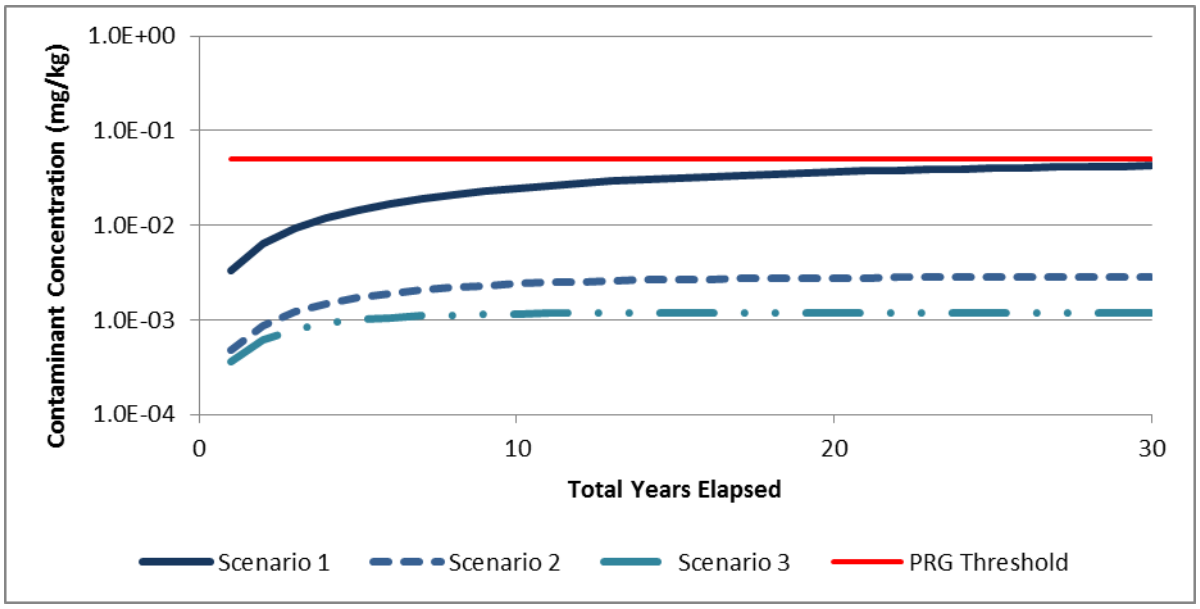


Figure 2.4: Dibenzo(a,h)anthracene.

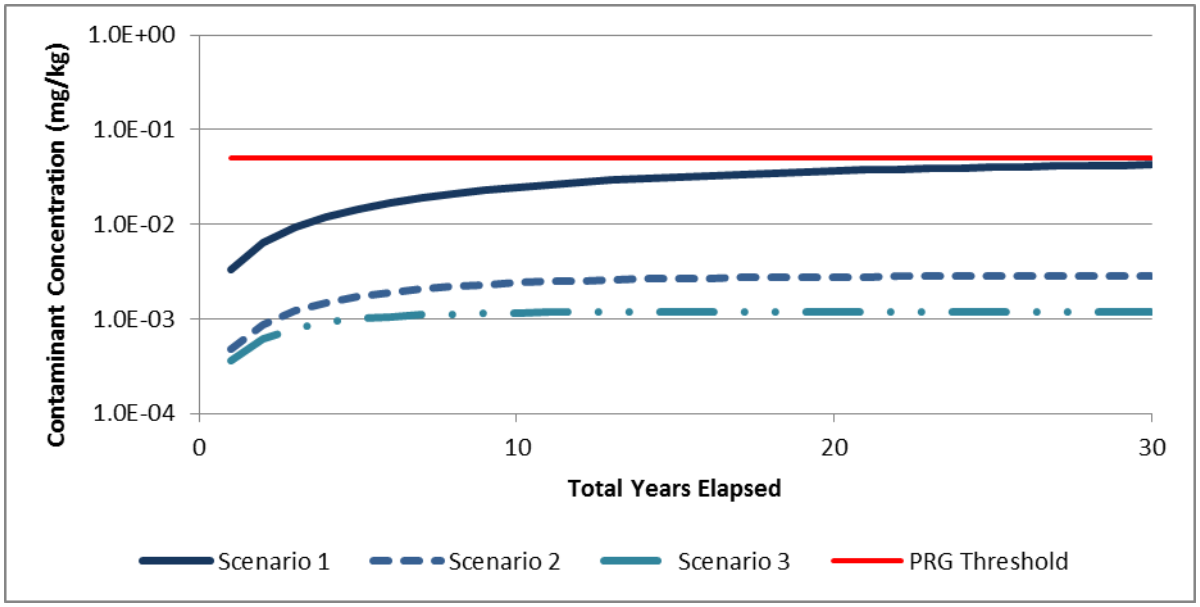


Figure 2.5: Indeno(1,2,3-cd)pyrene.

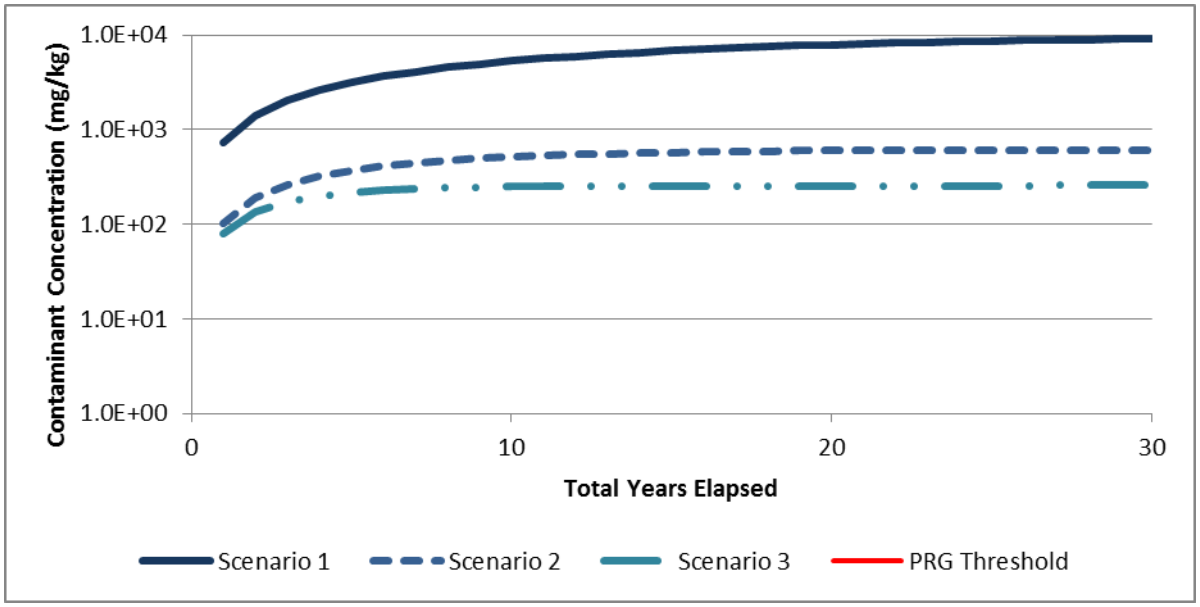


Figure 2.6: Iron

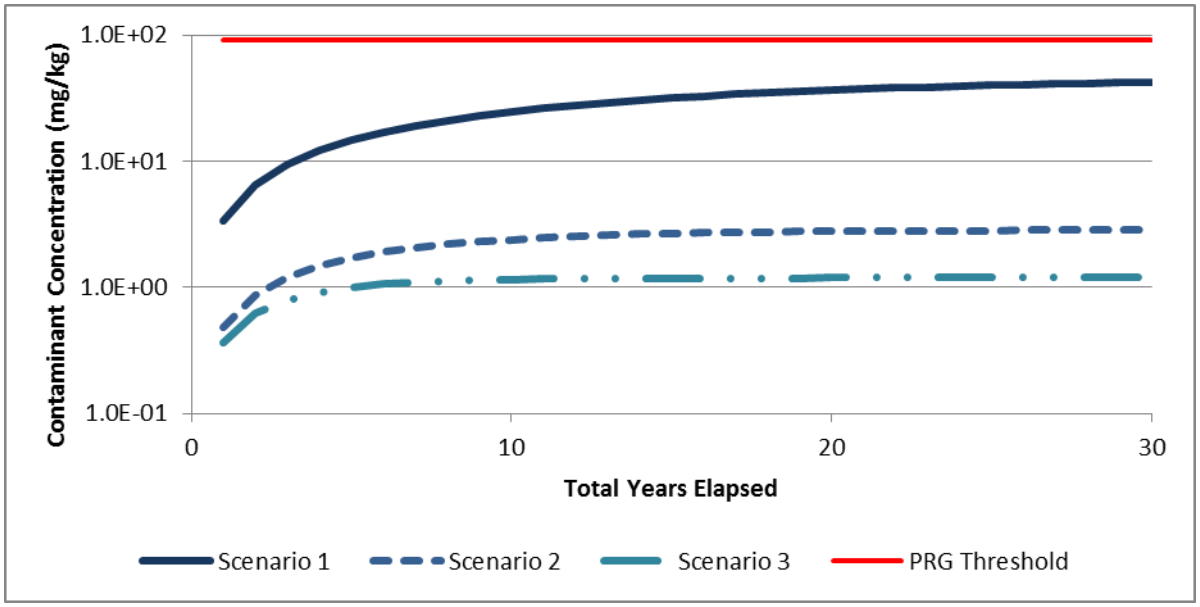


Figure 2.7: Lead.

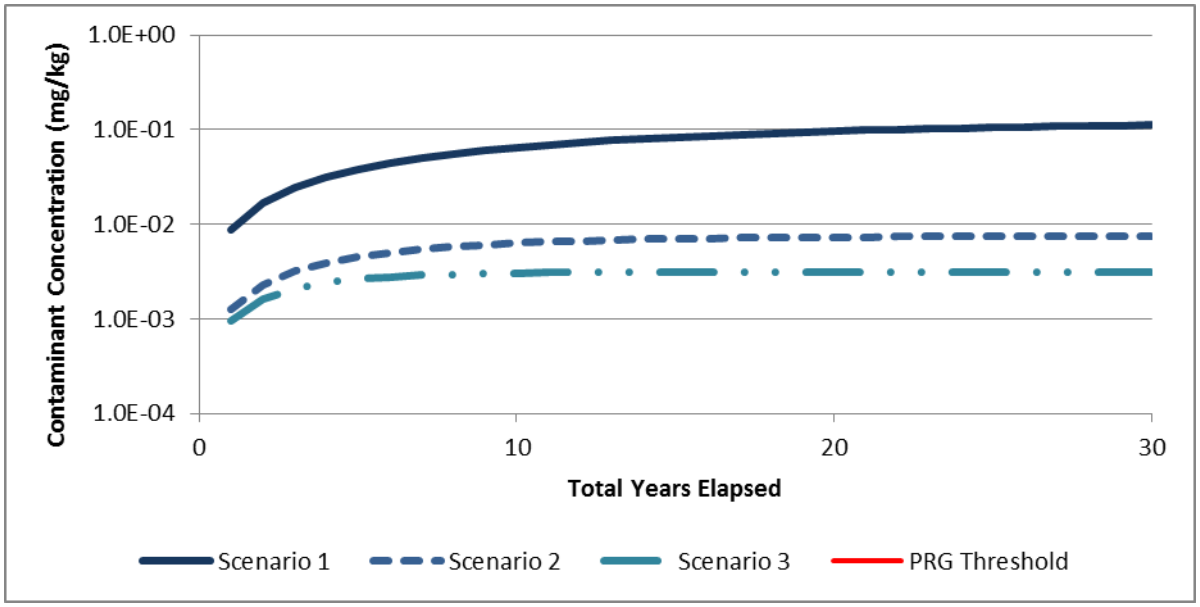


Figure 2.8: Mercury.

EXHIBIT 6

CITY OF PORTLAND
ENVIRONMENTAL SERVICES

Water Pollution Control Laboratory

6543 N Burlington Avenue, Bldg 217, Portland, Oregon 97203 ▪ Nick Fish, Commissioner ▪ Michael Jordan, Director

January XX, 2018

Robert J Wyatt
Northwest Natural Gas Company
220 NW 2nd Ave.
Portland, Or 97209

RE: 2017-2022 NPDES Permit Number 1200-Z, Monitoring Requirements
Facility: Northwest Natural Gas Company – 7900 NW St Helens Rd, Portland, OR 97210
File Number: «WQFileNbr»

Dear Permit Registrant:

The Oregon Department of Environmental Quality (DEQ) has issued coverage under the 2017-2022 1200-Z industrial stormwater discharge permit to the above referenced facility. The issuance letter and a signed copy of page 1 of the permit were mailed to you by DEQ. The City of Portland Bureau of Environmental Services has an Intergovernmental Agreement with the DEQ to administer permits for those facilities located within the City.

This letter details your monitoring requirements as well as your Tier II evaluation year. It is your responsibility to take all necessary steps to comply with conditions and requirements established in the permit.

Monitoring Requirements:
You must monitor for the pollutant parameters in the table below. If a parameter is listed more than once in the table below, you must sample according to the highest frequency and the laboratory results must meet the lowest concentration. If concentrations listed in the table below are exceeded, refer to *Schedule A.10* of the permit for required corrective actions.

Region	Pollutant	Statewide Benchmark	Unit	Frequency
Portland Harbor	Total Copper	0.020	mg/L	Four times per year
Portland Harbor	Total Lead	0.040	mg/L	Four times per year
Portland Harbor	Total Zinc	0.12	mg/L	Four times per year
Portland Harbor	pH	5.5-9.0	SU	Four times per year
Portland Harbor	TSS	30	mg/L	Four times per year
Portland Harbor	Total Oil & Grease	10	mg/L	Four times per year
LLID: 1227618456580	**Pollutant**	**Impairment Reference Concentration[1]**	**Units**	**Frequency**
Willamette River	Aldrin	0.003	mg/L	Two times per year
Willamette River	Chlordane	0.0024	mg/L	Two times per year
Willamette River	Dissolved Copper	0.012	mg/L	Two times per year
Willamette River	Cyanide	0.022	mg/L	Two times per year
Willamette River	DDT Metabolite (DDE)	0.00001	mg/L	Two times per year

	Alternatively DDT and its metabolites[2]	- 0.0011		
Willamette River	DDT	0.0011	mg/L	Two times per year
Willamette River	Dieldrin	0.000024	mg/L	Two times per year
Willamette River	Hexachlorobenzene	0.001	mg/L	Two times per year
Willamette River	Total Iron	1.0	mg/L	Two times per year
Willamette River	Dissolved Lead	0.014	mg/L	Two times per year
Willamette River	Mercury	0.0024	mg/L	Two times per year
Willamette River	PCBs[3]	0.002	mg/L	Two times per year
Willamette River	Polynuclear Aromatic Hydrocarbons (below)[4]			Two times per year
	Acenaphthene	0.095	mg/L	
	Anthracene	2.9	mg/L	
	Benz(a)anthracene	0.001	mg/L	
	Benzo(a)pyrene	0.001	mg/L	
	Benzo(b)fluoranthene 3,4	0.001	mg/L	
	Benzo(k)fluoranthene	0.001	mg/L	
	Chrysene	0.001	mg/L	
	Dibenz(a,h)anthracene	0.001	mg/L	
	Fluoranthene	0.014	mg/L	
	Fluorene	0.39	mg/L	
	Indeno(1,2,3-cd)pyrene	0.001	mg/L	
	Pyrene	0.29	mg/L	

[1] Impairment Pollutants apply to discharges to an impaired water without a TMDL for pollutant(s).
[2] the total concentration of DDT and its metabolites (i.e., DDD,-4,4', DDE,-4,4', and DDT,-4,4')
[3] Total PCB (based on the sum of the following aroclors: 1016, 1221, 1232,1242, 1248, 1254 and 1260)
[4] PAH impairments includes sampling for the following parameters: Acenaphthene, Anthracene, Benzo(a) anthracene, Benzo(a) pyrene, Benzo(b) fluoranthene 3,4, Benzo(k) fluoranthene, Chrysene, Dibenz(a,h) anthracene ,Fluoranthene, Fluorene, Indeno (1,2,3-cd) pyrene, Pyrene

Tier II Corrective Action Response Requirements:

Permit registrants must evaluate the geometric mean of qualifying sampling results collected during the **2nd monitoring year** of permit coverage to determine if a Tier II corrective action response is required (per *Schedule A.11*). Your facility's **Tier II evaluation year is July 1, 2018 to June 30, 2019.**

Please check the City of Portland Industrial Stormwater Program webpage via http://www.portlandonline.com/bes/index.cfm?c=31844& or DEQ's industrial stormwater webpage via http://www.oregon.gov/deq/wq/wqpermits/Pages/Stormwater-Industrial.aspx for general information, technical assistance on best management practices, and forms. If you have any questions about this permit, please contact your City of Portland stormwater permit manager:

Laura Johnson
6543 N. Burlington Ave
Portland, OR 97203
503-823-7192
Laura.Johnson@portlandoregon.gov

Sincerely,

Stacy Hibbard
Environmental Manager

Enclosure: Compliance Guidance Fact Sheet

cc: File

EXHIBIT 7

January 26, 2018

Ilene M. Munk
Managing Partner, Portland
Direct Dial: (503) 477-8660
imunk@foleymansfield.com

Via Email Only to: *nwr-stormwater@deq.state.or.us*

Stormwater Permitting Officer
DEQ Northwest Region Office
700 NE Multnomah St Suite 600
Portland, OR 97232

Re: Public comment for DEQ File # 62231

Dear Sir or Madam:

Siltronic Corporation submits these comments to the above NPDES 1200-Z general stormwater discharge permit application (the "Application") filed December 20, 2017, by Northwest Natural Gas Company ("NWN") for the NW Natural Gasco Property located at 7900 NW Saint Helens Rd, Portland, OR 97210-3671, Multnomah County (the "Site").

INTRODUCTORY STATEMENT

The interplay between environmental regulation and environmental enforcement is complex. Permitting provides industry with predictability necessary for operations, but must be balanced with state and federal governments' interest in limiting the environmental impact of industrial activities. While every Oregon NPDES permit application involves this interplay, Siltronic believes that NWN's Application is particularly significant due to NWN's history of pollution to the Willamette River, and the potential adverse impact of the proposed permitted discharges on the remedy to be implemented at the Portland Harbor Superfund Site ("PHSS").

The Site is located on the Willamette River between River Mile 6 and 7. The PHSS extends from River Mile 1.9 to River Mile 11.8 of the River, so the Site is in the approximate middle of the PHSS. The PHSS was placed on the National Priorities List in December 2000, but it took 16 years for the EPA and industry participants to complete the remedial investigations and analyses necessary for the Record of Decision, which the EPA issued in January 2017. The EPA selected dredging or capping, or both as one of the primary in-river remedies for the portions of the Willamette in front of the NWN and Siltronic sites.

Siltronic is providing comments because it believes that NWN's current discharges, including stormwater discharges, have a significant likelihood to cause or at least contribute to recontamination of the river after the remedy is implemented. Although many remedies would be affected by recontamination, dredging is particularly vulnerable to recontamination due to its temporal limitations. Unlike an ongoing pumping or filtration system, dredging and capping is a

one-time activity designed to remove sufficient contamination to immediately achieve sediment cleanup levels. Recontamination of the upper sediment layers of the dredged areas or dredged and capped areas via constituents released into the Willamette from ongoing upland sources could negate the extremely expensive benefits of the dredging and capping remedy the EPA has selected.

The threat of recontamination is particularly troubling considering the sampling results in Attachment 2 to NWN's Application. Levels of carcinogenic polycyclic aromatic hydrocarbons (PAHs) are worryingly high in the reported samples. PAHs are one of only four "focused" contaminants of concern ("COC") identified by the EPA for the PHSS[1]. According to a study conducted by consultant Newfields, the concentrations of PAHs associated with stormwater solids discharged from Outfall WR-107 on the NWN site are hundreds of times higher than the sediment cleanup level established for the PHSS. Newfields reported this finding at a November 2, 2017 meeting attended by EPA, DEQ, ExxonMobil, NWN, Siltronic and other concerned PRPs. Newfields also reported that the highest PAH levels measured in the stormwater solids across the PHSS were associated with the Site.

Given the high levels of COCs at the Site, Siltronic is concerned that the 1200-Z general industrial stormwater permit will not sufficiently regulate NWN's discharges into the Willamette River, an impaired waterway. Federal and state environmental regulators work together to protect water quality standards. Under the Clean Water Act, states are charged with establishing Total Maximum Daily Loads ("TMDLs") for contaminants that can be present in impaired state waterways, and these TMDLs form the basis for permitted effluent levels. However, some TMDLs have not been established for the Lower Willamette River. As a result, NPDES permits like the 1200-Z general stormwater permit at issue are based on other standards that are not as rigorous in protecting the public health and environment against degradation of water quality.

Siltronic urges DEQ to carefully consider the implications of issuing a general stormwater permit to a company with a decades-long history of discharging contaminants to the Willamette River before that company demonstrates that the permitted discharges will not contribute to exceedances of Oregon's water quality standards.

SILTRONIC'S INTERESTS MAY BE IMPLICATED BY NWN'S PERMIT APPLICATION

Siltronic has an interest in the NWN Application because Siltronic is located adjacent to and upstream of the Site. With respect to in-river work under the jurisdiction of the EPA, Siltronic and NWN jointly entered into an Administrative Order on Consent in 2009 for work designing a remedy for the remediation of the sediments and a portion of the riverbank and adjacent offshore areas of the two properties (the "2009 Joint Order").[2]

[1] The other focused COCs are PCBs, dioxins and furans and DDT and related products. ROD at p. 19.

[2] EPA Docket No. 10-2009-0255

Because Siltronic is adjacent to NWN on the Willamette River and is a party with NWN to a joint order involving design of an in-river remedy for the area offshore of both companies' property, Siltronic carefully monitors and in some cases is involved in the regulatory status of and environmental activities on the Site. Siltronic was therefore surprised to learn in the November 2, 2017, meeting with EPA and DEQ that NWN's stormwater outfall WR-107 was discharging high levels of contaminants, including PAHs, into the Portland Harbor, and that these ongoing discharges were occurring without a state or federal permit.

RELEVANT FACTUAL BACKGROUND

NWN conducted manufacturing operations at the Site under the name Portland Gas & Coke ("PG&C") from 1913 to 1958 when it changed its name to Northwest Natural Gas Company. PG&C built a manufactured gasification plant on the site in 1913, using primarily oil as a feedstock.[3] However, NWN conducted many other industrial activities on the Site included refining, coking, fuel oil production and chemical manufacturing. These activities occurred on the site from 1913 to 1957, at which time NWN converted operations to natural gas. These activities were substantial in scope and produced huge quantities of finished products[4] in addition to manufactured gas. For example, the plant produced 5,000,000 gallons of light oil products in 1951 alone, and 14 tons of coke per year. *Id.*

Plans of the historical plant indicate that significant portions of the plant site were dedicated to these refining and chemical manufacturing activities. In fact, in 1941, NWN constructed an entire chemical manufacturing plant for the production of toluol, xylol and solvent naptha.[5] Other refining activities resulted in the production of motor fuel, creosote, benzene and tar distillates.[6]

NWN's Stormwater Pollution Control Plan ("SWPCP") indicates that contaminants associated with . these non-MGP activities are present on the site, and that stormwater exposure to various historic contaminants is ongoing. SWPCP at Section 2.6.2 ("Site surface and subsurface soil investigations have found that the highest concentrations of volatile organic compounds (primarily benzene, toluene, ethylbenzene, and xylene), PAHs, and total petroleum hydrocarbons, as well as MGP by-products such as oil and tar, are located in the former tar pond, Koppers, and LNG areas of the Site and are generally associated with Subbasins B, A, and D/E, respectively (Figure 2-2)).")

These non-MGP activities may fall within the definition of "industrial activities" under the NPDES permitting regulations and the presence of materials from these former industrial

[3] Hull and Kohlhoff, 1952. Oil Gas Manufacture, a Staff-Industry Collaborative Report, Industrial and Engineering Chemistry, May issue at pp. 936-948.

[4] NWN 104(e) Response at pp. 74, 79-80.

[5] NWN 104(e) response at pp. 79-80.

[6] Hull and Kohlhoff at p. 946.

activities on the site to which stormwater is exposed may have necessitated a NPDES permit for the Site long before the DEQ issued the 2017 1200-Z general permit.[7] 40 CFR 122.26(b)(14).

COMMENTS

Comment 1: The level of some PAH and other pollutants in the NWN outfall exceeds the reference concentrations applicable to the 1200-Z stormwater permit NWN seeks.

The level of several carcinogenic PAH pollutants NWN reported in its permit application exceed the reference concentrations set out in the permit cover letter for the 1200-Z stormwater permit. The reference concentrations "reflect the approved acute aquatic life criterion for the pollutant when applicable. If there is not an acute criterion for the pollutant, DEQ or agent will use an applicable chronic criterion. If there is not a chronic criterion for the pollutant, DEQ or agent will use an applicable human health criterion." Permit at p. 22. These criteria are set out in OAR 340-041-8330 in Tables 30, 31 and 40, and "[t]he permit registrant must not cause or contribute to a violation of instream water quality standards as established in OAR 340-041."

NWN reports stormwater analytical results that exceed reference concentrations for PAHs benzo(a)anthracene, benzo(a)pyrene, benzo(b)flouranthene, chrysene and indeno(1,2,3-cd)pyrene. NWN Application at Attachment 2. All of these pollutants are listed as carcinogens in DEQ's Human Health Water Quality Criteria for Toxic Pollutants. Table 40, OAR 340-041-8033.

In addition, NWN's stormwater data indicates exceedances in the permit benchmarks for TSS and zinc and the reference concentration for cyanide.

Comment 2: The reference concentrations for several carcinogenic PAHs are set by DEQ at levels 1000 times the applicable Human Health Criteria levels and the EPA's surface water cleanup levels for the PHSS. How are these reference concentrations in stormwater entering the Portland Harbor reconciled with EPA's required clean up criteria[8] to which the PHSS parties will be held in demonstrating remedy effectiveness?

[7] *PennEnvironment v. PPG Industries, Inc.*, 127 F.3d 336 (W.D. Penn. 2015) (finding PPG was required to obtain an NPDES stormwater permit for stormwater discharges associated with historical waste that was generated elsewhere and thereafter placed on the site, because the former activity producing the waste was an "industrial activity" under 40 CFR § 122.26(b)(14).)

[8] Portland Harbor Record of Decision, Appendix II Table 17.

While many of the reference concentrations in the permit cover letter are the same as in the water quality standards set out in OAR-340-041,[9] the reference concentrations are orders of magnitude above the levels established for the PAHs referenced in Comment 1 of this letter and other pollutants. The human health criteria set for the carcinogens benzo(a)anthracene, benzo(a)pyrene, benzo(b)flouranthene, chrysene, benzo(k)flouranthene, dibenzo(a)anthracene and indeno(1, 2, 3-cd)pyrene are 0.0018 µg/L, which equals 0.0000018 mg/L. Yet the reference concentration set by the general permit is 0.001 mg/L (or 1 µg/L) for these pollutants. Thus, it is not clear that the proposed general permit for NWN will provide the source control necessary for the PHSS remedy.

Comment 3: The subject application does not satisfy the requirements for a general 1200-Z permit.

The 2017 1200-Z permit limits the coverage of the general permit under the conditions of NWN's application:

> A new discharger to an impaired water without a Total Maximum Daily Load… must meet one of the following conditions to obtain coverage under this permit:
>
> > i. Prevent all pollutants for which the waterbody is impaired from exposure to stormwater and document in the Stormwater Pollution Control Plan (SWPCP) procedures taken to prevent exposure on-site; or
> >
> > ii. Document in SWPCP that the pollutants for which the waterbody is impaired are not present at the site; or
> >
> > iii. Provide data and other technical information that demonstrates that the discharge is not expected to cause or contribute to an exceedance of the water quality standard for which the waterbody is impaired at the point of discharge to the waterbody if the pollutants for which the waterbody is impaired are likely to be present at the site and DEQ has not issued a TMDL for the pollutant(s).
> >
> > iv. If a new discharger is unable to meet the above condition, discharge must cease; or
> >
> > v. Obtain coverage under an individual permit.

[9] Compare, for example, DDT levels in the permit cover letter of 0.0011 mg/L with the Acute Criterion for DDT in Table 30 of OAR 340-041-8033 of 1.1 µg/L, Acute Criterion chlordane levels of 2.4 µg/L in Table 30 with the 0.0024 mg/L in the permit cover letter.

General Permit, National Pollutant Discharge Elimination System, Stormwater Discharge Permit at p. 5.

NWN's permit application on its face disqualifies NWN from all of the three criteria:

i. NWN's permit application indicates that soil contaminated with a pollutant for which the Portland Harbor is impaired are exposed to stormwater at the site:

> 2.6.2 Potential Pollutants Associated with Former Site Activities
>
> There are historical materials remaining on site from former site activities, as discussed in Section 2.5.2. Some materials are present in surface soil that have the potential to come into contact with stormwater. Areas of known historical contamination are shown in Figure 2-2 and summarized in the following sections.
>
> Site surface and subsurface soil investigations have found that the highest concentrations of volatile organic compounds (primarily benzene, toluene, ethylbenzene, and xylene), PAHs, and total petroleum hydrocarbons, as well as MGP by-products such as oil and tar, are located in the former tar pond, Koppers, and LNG areas of the Site and are generally associated with Subbasins B, A, and D/E, respectively (Figure 2-2). Elevated cyanide concentrations are found in the area of the former spent oxide pile on the largely undeveloped north end of the Site in Subbasin B.
>
> . . .
>
> Data characterizing areas of significant materials remaining on site from previous operations are presented in the 2007 Remedial Investigation Report prepared by Hahn and Associates, Inc. (HAI 2007) and the DEQ-approved Human Health and Ecological Risk Assessment Report (Anchor QEA 2014). A Site feasibility study is currently underway as discussed in Section 2.5.1 to support DEQ selection of a final cleanup for the Site.

SWPCP at p. 13 (emphasis added). NWN's SWPCP does not contain "procedures taken to prevent exposure on-site." NWN only refers to a feasibility study that may or may not lead to prevention of the exposure. Thus, NWN cannot demonstrate that it meets the first criterion.

ii. NWN's permit application indicates that pollutants for which the Portland Harbor are impaired are present at the site:

> Of these impairment pollutants, PAHs, cyanide, and metals (copper, iron, lead, mercury) are contaminants of concern in one or more media on the Gasco property, based on the results of the

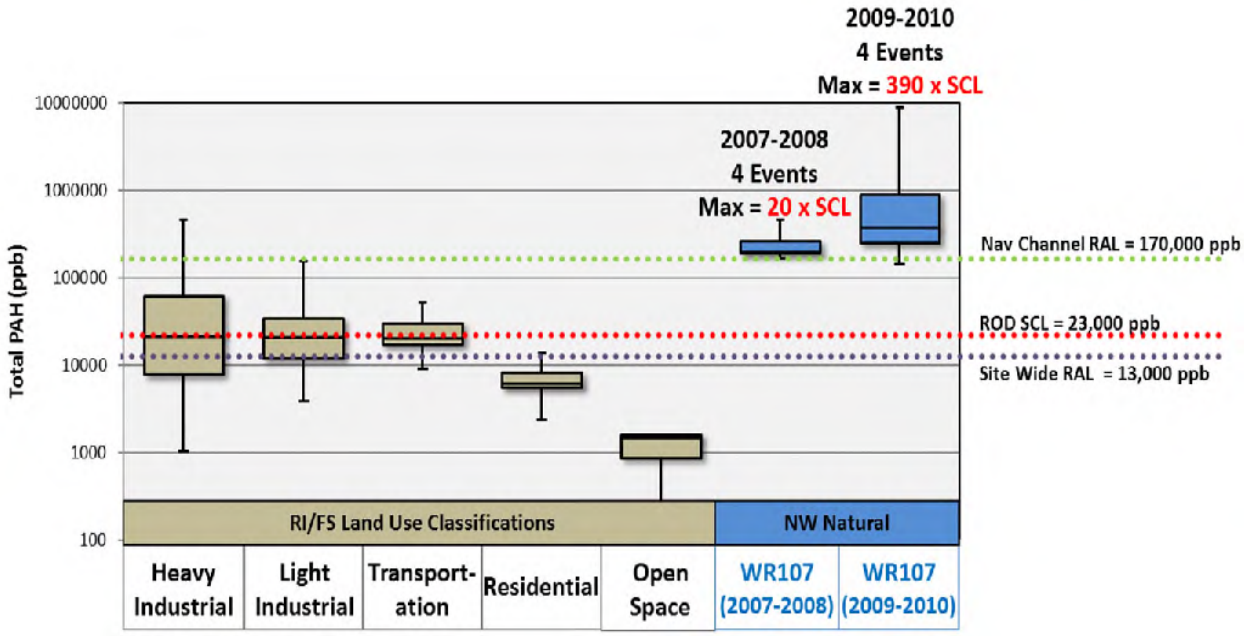
> Human Health and Ecological Risk Assessment Report (Anchor QEA 2014), and are therefore potential contaminants of concern in stormwater.

SWPCP at p. 7. Thus, on its face, the Application does not satisfy the second criterion.

iii. NWN's permit application does not provide data or other technical information demonstrating that the discharge under the general permit is not expected to cause or contribute to an exceedance of the water quality standard for which the waterbody is impaired. Instead, the permit application contains data establishing that the discharges will cause or contribute to an exceedance one or more of the water quality standards.

As discussed in Comment 1, the measured levels of contaminants in the Outfall WR-107 stormwater discharges exceed both benchmark and reference concentrations for the permit, which DEQ has set to meet State-promulgated water quality standards ("WQS") in accordance with requirements imposed by the Clean Water Act. Permit application, Attachment 2.

NWN's discharges of PAHs into the Willamette River are believed to be the highest in the entire Harbor, according to calculations made by environmental consultant Newfields using stormwater solids. The chart below illustrates how extreme the levels of PAH are from Outfall WR-107 as compared to various water standards imposed by the Record of Decision for the Portland Harbor Superfund Site. The use of stormwater solids specifically addressed the potential for sediment recontamination from the NWN stormwater.



Comment 4: NWN may have been previously required to obtain an NPDES permit because former industrial activities conducted at the Site may have exposed stormwater to significant materials remaining on the site.

A stormwater permit is required when former industrial activities left significant materials remaining on the site, and stormwater is exposed to those materials. 40 CFR 122.26(b)(14).

NWN claims in its permit application that changes to the 1200-Z form made in 2017 necessitated its application for a permit because the new permit form included "former activities that resulted in significant materials… remaining on site.". SWPCP at p. 1. If these former activities were "industrial activities" with an SIC code included in Table 1 to the 1200-Z permit, (derived from 40 CFR § 122.26(b)(14)(i)-(xi)), then an NPDES permit may have been required for stormwater discharges beginning years ago..

Many of the processes formerly conducted on the NWN site appear to be "industrial activities" under 40 CFR 122.26(b)(14). For example, the production of the millions of gallons of fuel oils at the Site might be assigned SIC code 28 or 29. 40 CFR § 122.26(b)(14)(ii).[10] NWN manufactured benzol for the chemical industry, an activity covered by SIC code 28 or 29. NWN manufactured and sold toluol, xylene and solvent naptha, activities covered by SIC code 28. *Id*.

The SWPCP indicates that historical material from these former non-MGP activities are present in surface soil that has the potential to come into contact with stormwater. "Site surface and subsurface soil investigations have found that the highest concentrations of volatile organic compounds (primarily benzene, toluene, ethylbenzene, and xylene), PAHs, and total petroleum hydrocarbons, as well as MGP by-products such as oil and tar, are located in the former tar pond, Koppers, and LNG areas of the Site and are generally associated with Subbasins B, A, and D/E, respectively (Figure 2-2))."). SWPCP at p. 13. NWN also indicates that these . wastes are located in the subbasins for which NWN seeks a stormwater permit. *Id*.

Comment 5: The DEQ should consider whether NWN should be required to apply for an individual permit to ensure that its stormwater discharges are not causing or contributing to a violation of water quality standards.

Section 4(c) of the 1200-Z permit allows the DEQ or its agent to require the applicant to obtain coverage under an individual permit if information in the application or other sources indicate that the discharge is causing or contributing to a violation of water quality standards. As noted in Comments 1 and 2, NWN's reported discharges exceed certain permit benchmarks and reference concentrations, some of which are themselves 1,000 times higher than the applicable Oregon water quality standards. Thus, it may be more protective of water quality standards to require NWN to submit an individual permit application in which it will required to provide more details concerning its discharges and their effect on the Willamette River.

[10] NWN 104(e) Response at pp. 80.

DEQ also has grounds for requiring NWN to apply for an individual permit because NWN's discharges are a significant contributor of pollution. OAR 340-045-0033.[11]

Comment 6: Water from Sub-basin E is discharged to the Willamette under a separate permit.

NWN's SWPCP states in Section 2.3 Receiving Water that "[w]ith the exception of Subbasin E and a small building rooftop on the NW Natural Mixing Station area, stormwater runoff from the Site discharges to the Willamette River via Outfall 107, which is located near river mile ("RM") 6.3."

This text implies that Subbasin E does not discharge to the Willamette River. This is not accurate. Stormwater runoff from Subbasin E (the LNG containment basin) is pumped to the Main Groundwater Treatment Plant, and subsequently discharged to the Willamette River via Outfall 001 under NPDES Permit number 103061. Siltronic suggests that this language be revised to clarify that stormwater from Subbasin E is discharged to the Willamette River via the Groundwater Treatment Plant.

Comment 7: Locations of overland flow into the Willamette are not indicated in Figure 2-1.

NWN's SWPCP states that "[t]here are several locations along the site shoreline where overland flows have been observed discharging over the top of the bank during heavy rain events. These discharge locations are shown in Figure 2-1." SWPCP at p. 8.

Siltronic notes that these areas are not identified in Figure 2-1. Figure 2-1 shows a number of "stormwater monitoring locations" along the site shore line, but does not confirm that these monitoring locations correspond to the areas of overland flow. Siltronic suggests that Figure 2-1 be revised to clarify the location of these areas of overland flow.

CONCLUSION

Siltronic encourages DEQ to take time in reviewing NWN's permit application to ensure the issuance of the requested permit would be protective of the environment. NWN has applied for a permit, but granting of the permit should be delayed and/or conditioned upon a demonstration that implementation of a stormwater source control plan controls discharges from

[11] (c) The grounds for requiring an individual permit include the following:

(A) The discharge or activity is a significant contributor of pollution or creates other environmental problems;

(B) The permittee failed to comply with, or is not currently in compliance with, the terms and conditions of the general permit, submitted false information, or the permittee is in violation of any applicable law. . . .

OAR 340-033-0045.

the site so that the discharges are not a continuing source of COCs to the PHSS, especially not while the available data show that the discharges are a continuing source. Approving ongoing discharges may allow for recontamination of the dredging and capping work which is the focus of the design effort of the 2009 Joint Order with EPA and with the overall remedy contemplated in the EPA's Record of Decision for the Site. The DEQ's Memorandum of Understanding with the EPA has allocated the control of upland sources to prevent recontamination of the river to DEQ. Siltronic respectfully requests that the DEQ consider whether granting a discharge permit to NWN that would allow it to continue discharges of contaminants, including focused COCs at the PHSS, is in accord with DEQ's environmental standards.

Sincerely,

Ilene M. Munk

cc: Sean Sheldrake, EPA *(via email only)*
Lori Cora, EPA *(via email only)*
Dana Bayuk, DEQ *(via email only)*
Alex Liverman, DEQ *(via email only)*
Keith Johnson, DEQ *(via email only)*
Leah Felton, DEQ *(via email only)*
Richard Whitman, DEQ *(via email only)*
Jim McKenna, Governor's office *(via email only)*
Kim Cox, City of Portland *(via email only)*
Dave Livesay, GSI *(via email only)*
Nanci Klinger, City of Portland *(via email only)*
Patty Dost, Pearl Legal Group *(via email only)*

EXHIBIT 8

Figure 4-20
Dioxin TEQs in Groundwater

Siltronic Corporation
Portland, Oregon

Legend

Dioxin TEQ

- 0.00103 - 0.485 pg/L
- 0.486 - 1.35 pg/L
- 1.36 - 10 pg/L
- 10.1 - 34.6 pg/L
- Non-detect
- Siltronic Property
- GOU-Allen
- Siltronic OU

Notes:
1. pg/L = picograms per liter
2. OU = operable unit
3. GOU = Gasco operable unit
4. TEQ = toxicity equivalent
5. J = estimated concentration
6. U = non-detection

0 130 260
Feet

Source: Aerial photograph obtained from Esri ArcGIS Online

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Exhibit 8-001